Final Assessment Test(FAT) - NOV/DEC 2025

Programme	B.Tech.	Semester	Fall Semester 2025-26
Course Code	BECE204L	Faculty Name	Prof. Chanthini Baskar
Course Title	Microprocessors and Microcontrollers	Slot	D2+TD2
		Class Nbr	CH2025260100494
Time	3 hours	Max. Marks	100

Instructions To Candidates
- Write only your registration number in the designated box on the question paper. Writing anything elsewhere on the question paper will be considered a violation.

Course Outcomes
CO1: Comprehend the various microprocessors including Intel Pentium Processors
CO2: Infer the architecture and Programming of Intel 8086 Microprocessor.
CO3: Comprehend the architectures and programming of 8051 microcontroller.
CO4: Deploy the implementation of various peripherals such as general purpose input/ output, timers, serial communication, LCD, keypad and ADC with 8051 microcontroller
CO5: Infer the architecture of ARM Processor
CO6: Develop the simple application using ARM processor.

Section - I
Answer all Questions (4 × 10 Marks)

01. Design a home security system that detects motion using a PIR sensor and triggers an alarm and message alert. Discuss whether this system should be developed using a microprocessor or microcontroller with proper justification , and explain the block diagram of the design.

    [10] (CO1/K2)

02. With a neat block diagram, explain the architecture of 8086 microprocessor in detail, highlighting the functions of its major functional units.

    [10] (CO2/K2)

03. The runs scored by 11 players of a cricket team are stored sequentially in memory starting at address 2200H. Write an 8086 assembly language program to
    (a) Calculate the total runs scored by the team. (2 Marks)
    (b) Find the highest individual score among the players. (3 Marks)
    (c) Compute the average runs scored by the team and store the result in the memory. (5 Marks)
    Store all the results sequentially in the memory starting from address 3000H, in the order:
    Total → Highest Score → Average.

    [10] (CO2/K3)

04. With the help of a neat block diagram, describe the key features and advantages of the ARM architecture. Compare and highlight how ARM differs from other architectures such as the 8086 processor and 8051 controller.

    [10] (CO5/K2)

Section - II
Answer all Questions (4 × 15 Marks)

05. (a) With a neat diagram, explain the memory organization of RAM and ROM in 8051 microcontroller. Highlight the division of internal RAM, Special Function Registers (SFRs), and the role of on-chip ROM. (8 Marks)
    (b) The last 10 readings of temperature and humidity are stored in internal RAM as follows:
    - Temperature readings are stored in the memory address: 30H – 39H
    - Humidity readings are stored in the memory address: 40H – 49H
    Design a system that:
    i. Turns ON a fan whenever the temperature exceeds 35°C.
    ii. Turns ON a water sprayer whenever the humidity falls below 40%.

Assume the fan is connected to P1.0 and the water sprayer is connected to P1.1 of the 8051 microcontroller. Write an 8051 assembly language program for the above system.
(7 Marks)

[15] (CO3/K3)

06. a) Write an 8051 assembly language program to generate a continuous train of 20 pulses on P1.5 with a pulse width of 100 µs. Use Timer 1 in Mode 2 (8-bit auto-reload). Assume XTAL = 12 MHz. **(8 Marks)**

b) A machine has a motor connected to Port 1.0 (P1.0) of the 8051 microcontroller.

The motor should run normally after system start-up.

If the emergency stop button connected to the external interrupt pin INT0 (P3.2) is pressed, the motor must stop immediately and remain OFF.

Write an 8051 assembly language program to implement this functionality. Also, explain the Special Function Registers (SFRs) used in this program. **(7 Marks)**

[15] (CO4/K3)

07. Write an 8051 assembly language program to interface the ADC0804 with the 8051 microcontroller and display the result on the LCD as follows:
- If the value > 128, display "HIGH" on LCD.
- If the value ≤ 128, display "LOW" on LCD.

The ADC digital output is connected to Port1 (P1).Use P2.0 = RD, P2.1=WR, P2.3=INTR for ADC0804 and P2.4 =RS, P2.5=R/W, P2.6= E for LCD control signals, P0.0 to P0.7 for LCD data pins.

[15] (CO4/K4)

08. a) For the ARM instructions listed in Table 1, compute and write the contents of the destination register (output) after execution. **(8 marks)**

Table:1

Instruction	Inputs	Output
MOV R0, R1, LSR #2	R1=0x0F300210	
ORR R0, R1, R2	R1=0x0F0F0F0F, R2=0xF000F000	
BIC R0, R1, R2	R1=0xFF02030F, R2=0x01006001	
RSB R0, R1, R2	R1=0x00341156, R2=0xFE230012	

b) Write an ARM assembly language program to compute X^Y (X raised to the power Y), where:
- The base X is stored in register R0.
- The exponent Y is stored in register R1.
- The result should be stored in register R2.

Ensure your program correctly handles the case when Y = 0. **(7 Marks)**

[15] (CO6/K3)

BL-Bloom's Taxonomy Levels - (K1-Remembering,K2-Understanding,K3-Applying,K4-Analysing,K5-Evaluating,K6-Creating)

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