



**Final Assessment Test(FAT) - NOV/DEC 2025**

Programme	B.Tech.	Semester	Fall Semester 2025-26
Course Code	BECE204L	Faculty Name	Prof. Dhanush R
Course Title	Microprocessors and Microcontrollers	Slot	G1+TG1
Time	3 hours	Class Nbr	CH2025260102220

**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 (1 × 5 Marks)**

01. Explain with a suitable block diagram the microcontroller based real time monitoring system to monitor water level, humidity and temperature in the aquaculture farm.

[5] (CO1/K2)

**Section - II**

**Answer all Questions (8 × 10 Marks)**

02. Three LEDs are connected to the lower three Port C pins (PC.0 to PC.2) of an 8255 PPI chip, which is interfaced with 8086. Develop an assembly language program that will turn ON the LEDs one by one in sequence, maintaining a time interval between successive LEDs. Assume the base address of Port A is 70H and utilize BSR mode for controlling the LEDs.

[10] (CO2/K3)

03. For the following 8086 instructions given in Table 1, identify the addressing mode used and calculate the physical memory address accessed by each instruction. Assume the register values as: BX = 1000H, SI = 2000H, DS = 3000H, BP=0F00H, DI=0200H, SS=0100H.

Table 1

Instructions	Addressing Modes	Physical Address
MOV AX, [BX+20H]		
MOV CX, [SI+00A0H]		
MOV AX, [BX+SI]		
MOV AX, [BP+DI+0F0H]		
MOV CX, [BX+SI+50H]		

[10] (CO2/K3)

04. Given the expression  $y = x^2 + 3x + 6$ , where the value of x ranges from 0 to 9. A look-up table containing the values of  $x^2$  is stored in the program memory starting from the address 300H. Write an 8051 assembly language program to compute the expression for y and store the results in R2. Assume x can have only one value from 0 to 9 for computing y.

[10] (CO3/K3)

05. Compute the stack pointer (SP) and stack content for the given 8051 assembly program, including the impact of each instruction on the stack and registers.

MOV SP, #40H

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MOV R2, #25H
MOV R5, #3AH
MOV R7, #10H
PUSH 2
MOV A, R2
ADD A, R5
MOV R3, A
PUSH 3
PUSH 5
MOV A, R3
ADD A, R5
MOV R6, A
PUSH 6
PUSH 7
POP 7
POP 6
POP 5
POP 3
POP 2
HERE: SJMP HERE

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[10] (CO3/K3)

06. Eight binary sensors are connected to Port 1 of the 8051 and the microcontroller must send these readings to LEDs connected on Port 2. At the same time, the microcontroller receives serial data from the serial port, and this received data must be displayed on Port 0 for monitoring. Assume the system crystal frequency is 11.0592 MHz, and the serial communication is to be set up for a baud rate of 9600 bps using Timer 1 Mode 2. Write an 8051 assembly language program to perform these tasks continuously.

[10] (CO4/K3)

07. A department information display system is designed using an 8051 microcontroller to show department details on an LCD module. The 16x2 LCD is connected to Port 1 of the microcontroller, and it must display the message “MPMC LAB” from the third position of the second line. The system should initialize the LCD properly, use delay routines and then continuously display the message on the screen.

[10] (CO4/K3)

08. An analog sensor is connected to an 8051 through ADC0804. The 8-bit digital output of the ADC is interfaced with Port 1 of the 8051 microcontroller. Write an 8051 assembly language program to continuously read the digital data corresponding to the analog voltage from the sensor. Assume the RD, WR, and INTR of the ADC are connected to Port 2 pins P2.5, P2.6, and P2.7 respectively.

[10] (CO4/K3)

09. Explain the various processor modes in the ARM7 processor.

[10] (CO5/K2)

### Section - III

#### Answer all Questions (1 × 15 Marks)

10. Calculate the resulting register values after executing each ARM7 instruction provided in the Table 2.

Register	Instructions
R1= 0xFFFFFFFF, R2= 0xE1EEEEAA	BIC R3,R2,R1
R1= 0xFFFFFFFF, R2 = 0xAAAAAAA	MVN R2,R1
R1 = #0xD10C0054	EOR R2,R1,#0x78
R0 = 0x1B22229A, R2=0x03	MOV R1,R0,LSR R2
R0 =0xCCCEFF18, R1=16	ROR R2,R0,R1

[15] (CO6/K3)

