



TECHNICAL UNIVERSITY OF MOMBASA

School of Engineering and Technology

DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

UNIVERSITY EXAMINATIONS FOR BACHELOR OF SCIENCE IN ELECTRICAL AND
ELECTRONIC ENGINEERING

TEE 4431

MICROCONTROLLER

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: JULY 2025

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass, and student ID

This paper consists of **five** Questions

Attempt QUESTION ONE (COMPULSORY) and any other TWO Questions.

Do not write on the question paper.

QUESTION ONE (COMPULSORY) (30 marks)

- (a) Discuss the classification of microcontrollers according to:
 - (i) Number of bits
 - (ii) Memory (10 marks)
- (b) Differentiate microcontrollers from microprocessors using FIVE factors (10 marks)
- (c) Explain any THREE applications of microcontrollers (6 marks)
- (d) Explain TWO reasons for interfacing in microcontroller systems (4 marks)

QUESTION TWO

- (a) Use a diagram to discuss the pin configuration of the PIC16F84A microcontroller (8 marks)
- (b) An LED is connected to **RA1** of the PIC16F84A microcontroller, and a program is required to cause the LED to flash ON and OFF continuously once the circuit is powered, with a one-second time delay.
 - i. Draw the circuit
 - ii. Write the program (12 marks)

QUESTION THREE

- (a) Explain the functions of the following:
 - (i) Serial port
 - (ii) Parallel port
 - (iii) Interrupt controller (6 marks)
- (b) Explain the operation for the following instructions:
 - (i) DECFSC
 - (ii) BTSS PORTB, 0. (4 marks)
- (c) With reference to the PIC16F84A microcontroller, explain the functions of the following registers:
 - (i) TRISB
 - (ii) STATUS (4 marks)
- (d) Write instructions for the PIC microcontroller to initialize PORTB as input and PORTA as output. (6 marks)

QUESTION FOUR

- (a) Explain the following program development tools and give ONE example for each case
 - (i) Compiler
 - (ii) Linker
 - (iii) Assembler
 - (iv) Loader (8 marks)
- (b) Draw the 8051-microcontroller architecture and explain the function of each block (10 marks)
- (c) State any FOUR features of the 8051 microcontroller (4 marks)
- (d) Explain the functions of the following 8051 microcontroller registers
 - (i) Data Pointer (DPTR)
 - (ii) Program Counter (PC)
 - (iii) Stack Pointer (SP)
 - (iv) Accumulator (8 marks)

QUESTION FIVE

- (a) Explain the function of each of the following in microcontroller programming
 - (i) BIOS
 - (ii) DOS (4 marks)
- (b) Explain the importance of the following in programming the microcontroller
 - (i) Program modularization
 - (ii) Relocation
 - (iii) Position independent code
 - (iv) Parameter passing (8 marks)
- (c) An LED is connected to P1.2 of the 8051. Write a program in assembly language to blink the LED continuously with a time delay of one second (8 marks)