Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S4 (R) (FT/WP) Examinations April 2026 (2024 Scheme)

Course Code: PBECT404

Course Name: MICROCONTROLLERS

Max. Marks: 40 Duration: 2 hours 30 minutes

PART A

(Answer all questions. Each question carries 2 marks)

		CO	Marks
1	Differentiate between address bus and data bus.	1	(2)
2	Explain the roles of the Program Counter (PC) and Stack pointer (SP) in instruction execution process of a microcontroller	1	(2)
3	Differentiate between PUSH and POP operations with respect to stack memory in a microcontroller.	2	(2)
4	Which 8051 addressing mode is best suited for accessing large blocks of data in external memory? Explain how it works and why it is preferred over other addressing modes for this purpose.	2	(2)

5	Trace the execution of the following 8051 instructions and determine the status of the CY, AC,and P flags after this code snippet is executed.
	
	MOV A, #9BH
	
	ADD A, #79H
		3	(2)

6	Write an 8051 C program to toggle only the upper nibble of Port 1 continuously while keeping the lower nibble unchanged.	3	(2)
7	Explain the pin configuration of the RS-232 standard and describe how it is	4	(2)

interfaced with the 8051 microcontroller to establish serial communication.

8		Describe the sequence of steps followed by the 8051 microcontroller when an interrupt occurs, from the interrupt request to the return to the main program.	4	(2)

PART B

(Answer any one full question from each module, each question carries 6 marks)

Module -1

9	a)	Explain with relevant figures the internal structure of port 1 in the 8051 microcontroller.	1	(6)
10	a)	Explain the role of the Program Status Word (PSW) in the 8051 microcontroller and describe the significance of each bit in the PSW register.	1	(3)
	b)	What are the altemative functions supported by Port 3 of 8051?	1	(3)

Module -2

11	a)	Explain the JC, JZ, and JNZ jump instructions of the 8051 microcontroller with the help of suitable examples. How do these instructions control the flow of a program	2	(3)
	b)	Explain the difference between SJMP, AJMP and LJMP instructions in the 8051. How does the jump range of each instruction differ, and in what situations would you choose one over the other?	2	(3)
12	a)	What is an addressing mode? Briefly explain the different types of addressing modes supported by the 8051 microcontroller	2	(3)
	b)	.For each of the following 8051 instructions, state the operation performed, identify the addressing mode used, and illustrate with a numerical example showing the contents of the relevant registers before and after execution. (a) ANL A, @Rr (b) XCH A, @R0 (c) DIV AB	2	(3)

Module -3

13	a)	What is the difference between data types and assembler directives in 8051 assembly language? Explain each with suitable examples	3	(3)
	b)	Evaluate and write an 8051 assembly language program to copy 10 bytes of data starting from memory location 20H to another memory location starting from 50H. Justify the choice of loop and addressing mode used in the program.	3	(3)
14	a)	List any three advantages of Embedded C over assembly language	3	(3)
	b)	Write an 8051 C program to get a byte of data form P0. If it is less than 100, send it to P1; otherwise, send it to P2.	3	(3)

Module -4

15	a)	Draw and explain the format of 8051 Timer registers.	4	(3)
	b)	Write an 8051 Assembly Language program to generate a continuous square wave of 1KHz using Timer 1 in Mode 2. Assume 1 μs machine cycle.	4	(3)
16	a)	Design and explain the step-by-step procedure to implement serial data transfer in the 8051 microcontroller. Illustrate how the necessary registers are configured and data transmission is initiated.	4	(3)
	b)	Write a program for the 8051 to transfer "YES" serially at 9600 baud, 8-bit data, 1 stop bit, do this continuously	4	(3)

***