Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – WINTER 2023

Subject Code:3151107 Date:07-12-2023

Subject Name:Advance Microcontroller

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Describe IRQ and FIQ processor mode in ARM.	**03**
	(b)	Differentiate RISC and CISC.	**04**
	(c)	Describe the RISC features which are accepted and rejected to design ARM architecture.	**07**
Q.2	**(a)**	Describe each field of CPSR Register.	**03**
	(b)	Describe following ARM instructions with example: (1) ADDEQS (2) MLA (3) TEQ (4) MVN	**04**
	(c)	Describe 3-stage pipelined architecture of ARM7.	**07**
		OR	
	(c)	What is Cortex? Compare features of ARM Cortex series with ARM7 core.	**07**
Q.3	**(a)**	Write assembly language program to multiply given number(in R2 register) by 35 without using multiply instructions. Move result to R10 register after operation.	**03**
	(b)	Describe following instruction with its addressing mode, with example. (1) LDR R1, [R2], 16 (2) LDR R1, [R2, 16] (3) LDR R1, [R2, 16]! (4) LDR R1, [R2, R3]!	**04**
	(c)	Describe “Branch” and “Branch with Link” instruction with suitable example.	**07**
Q.3	**(a)**	Write assembly language program to (1) shift left R1 by 32 and (2) logical shift right R2 by 8 (3) Add both result in R3. Assume R1=0x34, R2 = 0x53A0, What will be content of R1, R2 and R3 after executing the code.	**03**
	(b)	Describe following instructions with suitable example. (1) LDMIA R1, {R2-R10} (2) LDMDB R1!, {R2-R10}	**04**
	(c)	Describe Thumb mode in ARM processor. Differentiate ARM mode and Thumb Mode. How to switch from/to Thumb mode to/from ARM mode?	**07**

Q.4 **(a)** What is MMU? Enlist merits and demerits of MMU. **03**

(b) Describe following assembler directives: **04**
AREA, DCD, ADR, ENTRY

(c) Sketch circuit diagram of LCD interfacing with LPC2148. Write C-program to display "MICROCONTROLLER" on first line of LCD. **07**

OR

Q.4 **(a)** Enlist main control components of ARM MMU. **03**

(b) Write assembly language instruction for following operations: **04**

```
if(R0 < (R5+R7))
{
   R1 = R1 + R2*8
   R3 = R3 – R1*16
}
```

(c) Sketch circuit diagram to interface following devices with LPC2148. **07**

(1) Eight LEDs at P1.0 to P1.7
(2) single switch (SW1) at P1.16
(3) Single relay (R1) at P1.20

Write C-program to turn on LEDs as per binary counter if switch is pressed. When counter pattern reach at 0xFF, turn-on relay for 1 second.

Q.5 **(a)** Describe code optimization techniques of embedded C-programming **03**

(b) Describe basic architecture of cache memory. **04**

(c) Sketch and Describe AMBA bus arbitration with help of diagram. **07**

OR

Q.5 **(a)** Describe concept of inline assembly code in ARM C-program. **03**

(b) Describe function of translation look aside buffers in virtual memory system. **04**

(c) Compare AHB, APB and ASB of AMBA bus system of ARM Architecture. **07**

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