Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – SUMMER 2021

Subject Code:3151107 Date:09/09/2021

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.**

Q.1	**(a)**	Explain the difference between Von-Neumann and Harvard architecture.	**03**
	(b)	Compare RISC and CISC philosophy. Explain the features of pure RISC systems.	**04**
	(c)	Explain ARM7TDMI programmer's model. Explain all registers of ARM7TDMI architecture.	**07**
Q.2	**(a)**	Explain barrel shifter instructions LSL, LSR and ASR with example.	**03**
	(b)	Explain following instructions with at least one example for each (1) BIC (2) EOR (3) TEQ (4) RSB	**04**
	(c)	Explain concept of pipeline used in ARM processor. Explain three stage pipelining used in ARM7TDMI processor.	**07**
		OR	
	(c)	Discuss ARM core extensions and architecture revisions. List at least two applications for Cortex A, Cortex M and Cortex R processors.	**07**
Q.3	**(a)**	What is conditional execution? State the advantage of conditional execution over branch operation with suitable example.	**03**
	(b)	Explain the significance of program status registers CPSR and SPSR. Why two program status registers are used in ARM processors?	**04**
	(c)	State ARM Processor Modes and explain each with suitable example.	**07**
		OR	
Q.3	**(a)**	State and explain the difference between ARM state and Thumb state?	**03**
	(b)	What are the exceptions in ARM processor? Explain process of exception entry and exception return.	**04**
	(c)	Explain following instructions of ARM7TDMI processor. (i) LDR R0, [R2] (ii) STR R0, [R2,#4] (iii) LDRB R0, [R2], #1 (iv) LDMIA R0!, {R2-R6} (v) STMED SP!, {R0, R1, R2} (vi) ADDEQ R0, R1, R2 (vii) MVN R0, R2	**07**

Q.4	**(a)**	What are the advantages and disadvantages of assembly language programming compared to C programming?	**03**
	(b)	Write ARM assembly language program for HEX number to ASCII conversion. Assume HEX number is stored in register R1.	**04**
	(c)	State and explain Registers related to General Purpose Input Output (GPIO) configuration for ARM Based microcontroller. Also write a C program to configure Port 0 as input port and Port 1 as output port.	**07**

OR

Q.4	**(a)**	What are assembler directives? Explain any three assembler directives used for ARM assembly programming.	**03**
	(b)	Write ARM assembly language program for sorting signed 8-bit binary numbers stored in RAM locations starting from 0x40000000.	**04**
	(c)	Draw interfacing diagram to interface push-button switch at port pin P1.0 and common anode seven segment display with port pins P0.0 to P0.7. Write C program to read switch and display number of seven segment display. Initially 0 should be displayed. When switch is pressed, number should increase (UP counting).	**07**
Q.5	**(a)**	Explain the function of registers associated with Timers of ARM based microcontroller.	**03**
	(b)	Discuss techniques for optimization of memory needs while writing C program for ARM based microcontroller.	**04**
	(c)	Explain Advance Microprocessor Bus architecture (AMBA) and discuss its special features.	**07**

OR

Q.5	**(a)**	What is cache performance? On which factor it depends?	**03**
	(b)	Explain I2C and SPI protocols.	**04**
	(c)	Explain the concept of Virtual Memory for advance processor-based system.	**07**

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