

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2023****Subject Code:2151001****Date:02-12-2023****Subject Name:Microcontroller and Interfacing (EC)****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) Compare IN instruction with LDS instruction.	03
	(b) Describe the flag register of AVR microcontroller.	04
	(c) Write short notes on AVR data memory.	07
Q.2	(a) Explain any three assembler directives of AVR.	03
	(b) Compare RISC and CISC architecture.	04
	(c) Explain the following instruction with an examples (i) BRSH (ii) CBI (iii) SBIS (iv) NEG (v) ASR (vi) SWAP (vii) LDI	07
	OR	
	(c) Write an assembly language program using look-up table method to get value of x from Port B and send x^2 to Port C. Assume that PB3-PB0 has x value of 0-9.	07
Q.3	(a) Write an assembly language code to transfer value \$30 on the location \$105 and on the PORT B IO register.	03
	(b) Describe JMP, RJMP, IJMP and Conditional JMP instructions of AVR.	04
	(c) Write a 'C' program to read the keypad and send the result to Port D PC0-PC3 connected to column PC4-PC7 connected to rows	07
	OR	
Q.3	(a) Write an assembly language code to determine if RAM location 0x200 contains the value 0. If so, put 0x55 into it.	03
	(b) Describe CALL, RET, RCALL and ICALL instruction of AVR.	04
	(c) Explain the dual role of Port A, B, C and D of AVR also explain the role of DDR register to inputting and outputting of data with an example.	07
Q.4	(a) Write a 'C' program to convert packed BCD 0x34 to ASCII and display the bytes on PORT B and PORT C.	03
	(b) Explain Timer/Counter Control and Interrupt flag register of AVR.	04
	(c) Write a 'C' program to toggle only the PORTB.4 bit continuously every 70 μ S. Use Timer 0, normal mode, and 1:8 pre-scaler to create the delay. Assume XTAL = 8 MHz	07
	OR	
Q.4	(a) Write a 'C' program to convert ASCII digit of '7' and '2' to packed BCD and display them on PORT B.	03
	(b) Explain MCU Control Register and Status Register of AVR with necessary diagram.	04
	(c) Write a 'C' program using Timer 1 of AVR which toggles pin PORTB.5 every second, while at the same time transferring data from PORT C to PORT D. Assume XTAL = 8 MHz.	07

- Q.5 (a)** With $V_{ref} = 1.28\text{ V}$, find the V_{in} for following outputs **03**
 (a) D7-D0 = 11111111 (b) D7-D0 = 10011001
 (c) D7-D0 = 01101100
- (b)** Assuming XTAL = 8MHz, using non-inverted mode, write an assembly or 'C' program that generate a wave with frequency of 31,250 Hz and duty cycle of 75 %. **04**
- (c)** Discuss I2C BUS protocol with necessary diagram **07**
- OR**
- Q.5 (a)** Calculate the step size for following ADC if V_{ref} is 5 V **03**
 (a) 8-bit (b) 10-bit (c) 12-bit (d) 16-bit
- (b)** Write a 'C' program that gradually changes the speed of DC motor from 50% to 100% **04**
- (c)** Discuss SPI BUS protocol and its various modes with necessary diagram. **07**
