

Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-V (NEW) EXAMINATION – SUMMER 2024

Subject Code:2151001

Date:14-05-2024

Subject Name:Microcontroller and Interfacing (EC)

Time:02:30 PM TO 05:00 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) List various AVR family microcontroller with their specifications.	03
	(b) Explain the simplified view of an AVR microcontroller with necessary diagrams.	04
	(c) Explain the hardware architecture of ATmega32 microcontroller.	07
Q.2	(a) Explain the following assembler directives, (i) .EQU (ii) .ORG (iii).INCLUDE	03
	(b) Describe the relation between the registers and pins of AVR microcontroller.	04
	(c) Write an assembly language program to generate square wave of 50% duty cycle on bit '0' of port 'C' and 60% duty cycle on bits '3' of port 'C'.	07
	OR (c) Write short notes on register and direct addressing mode with an example and necessary diagrams.	07
Q.3	(a) Explain the status register of AVR microcontroller.	03
	(b) What is MACRO and how is it used?	04
	(c) Classify the instruction sets of AVR microcontroller and explain it with an example.	07
Q.3	OR (a) Compare arithmetic shift with logical shift operation of AVR microcontroller.	03
	(b) Describe the features of RISC processor.	04
	(c) Write an assembly language program to transfer the value 41H serially (one bit at a time) via pin PB1. Put active high bit at the start and end of data bits. Send the LSB first.	07
Q.4	(a) Compare branch and CALL instructions of AVR controller.	03
	(b) Explain interfacing concept of stepper motor with necessary diagrams.	04
	(c) Explain the interfacing of stepper motor via an opto-isolator with necessary diagrams and write a 'C' language program to monitor the switch connected with PA7. If the SW=0, the stepper motors move	07

clockwise else anticlockwise.

OR

- Q.4** (a) Explain the feature of ADC available in AVR. Assume 10 bit ADC and $V_{ref} = 2.56$ volt. Calculate D0-D9 bits output if the analog input is 0.2V. **03**
- (b) Write a 'C' language program to read a temperature sensor and display on port D. **04**
- (c) Write a 'C' language program to read the keyboard and send the result to port D. Assume PC0-PC3 connected to columns and PC4-PC7 connected to rows. **07**
- Q.5** (a) Explain the use of PWM signal in AVR controller with an example. **03**
- (b) Explain SPI protocol of AVR microcontroller. **04**
- (c) Explain asynchronous serial communication and write a 'C' language program to transfer letter 'A' serially at 9600 baud rates continuously. Use 8-bit data, and 1-stop bit. Assume XTAL= 8 MHz **07**
- OR**
- Q.5** (a) Define the interrupts and types of interrupts available in the AVR controller. What is the priority of it. **03**
- (b) Write a 'C' language program that gradually changes the speed of a DC motor from 50% to 100%. **04**
- (c) Write short notes on I2C protocol with necessary diagrams. **07**
