Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–IV (NEW) EXAMINATION – WINTER 2024

Subject Code:3141008 Date:03-12-2024

Subject Name:Microprocessor & Microcontroller

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)**	High light main differences between microprocessor and microcontroller	**03**
	(b)	Explain role of microcontroller in embedded systems	**04**
	(c)	Explain internal architecture of 8085 Microprocessor. What is the significance of flags in the 8085 microprocessor? Explain any two flags.	**07**
Q.2	**(a)**	What is the AVR status register, and what information does it hold?	**03**
	(b)	Explain any four bit manipulation instructions in AVR microcontroller with example.	**04**
	(c)	What is importance of General Purpose Input Output (GPIO) Ports in Microcontroller ? Explain DDR, PIN and PORT registers associated with GPIO with neat sketches.	**07**
		OR	
	(c)	Consider that Ignition Switch is connected to PD1, Seat belt switch is connected to PD2 Buzzer is connected to PC3 and LED is connected to PC4. Write C Program for AVR microcontroller such that it turn on LED and sound buzzer if the key is in the ignition closed(PD1 is at logic 0), but seat belt is not latched (PD2 is at logic 1).	**07**
Q.3	**(a)**	Which register is used to configure a PORT C as an input or output in AVR microcontroller? Write assembly language instruction to configure PORT C as an output port.	**03**
	(b)	Draw interfacing diagram to interface push-button switch with port pin PD0. Explain instructions SBIS and SBIC to check status of input pin PD0 in AVR microcontroller with help of example.	**04**
	(c)	What is the importance of stack memory in microcontroller? In which situation stack memory is utilized? Explain stack operations in AVR microcontroller with example.	**07**
		OR	
Q.3	**(a)**	What will be value of Program Counter (PC) when we connect power supply pin Vcc to RESET pin in AVR Microcontroller? Draw power on RESET circuit.	**03**
	(b)	What are the methods by which we can generate time delay in AVR Microcontroller? Write a simple C program for generating a time delay in AVR.	**04**

	(c)	Write assembly or C language program to toggle all bits of PORTD continuously at every 200 microsecond. Use timer 0, CTC mode with 1:8 pre-scaler. XTAL=8 MHz	**07**
Q.4	**(a)**	Write assembly language program to read data from pins of PORTA, compare data with value 0x7F, Set port pin PD0 to high if data is greater than 0x7F and low if data is less than 0x7F.	**03**
	(b)	What is interrupt? Explain the process of configuring interrupts in AVR	**04**
	(c)	Assuming that program ROM space starting 0x600 contains message "UNIVERSAL HUMAN VALUES". Write assembly language program to send all message characters to PORTD one byte at a time using look up table method.	**07**
		OR	
Q.4	**(a)**	What are the advantages of using assembly language in time-critical applications?	**03**
	(b)	Compare SPI and I2C protocols	**04**
	(c)	Describe process of interfacing LCD with AVR Microcontroller with interfacing diagram and write program to display message "Microprocessor" and on first line and "Microcontroller" on second line of 16x2 LCD display.	**07**
Q.5	**(a)**	Explain ADC control and status register ADCSRA	**03**
	(b)	Draw interfacing diagram of one push-button switch and relay with AVR Microcontroller. Write program such that status of relay should toggle at every press of push-button switch.	**04**
	(c)	List any four applications of servo motor. Explain interfacing of servo motor with AVR Microcontroller and write program to control servo motor for angle 0^0, 90^0 and 180^0.	**07**
		OR	
Q.5	**(a)**	Discuss interrupt versus polling method of getting service of microcontroller by the device. Which method is more efficient in terms of response time?	**03**
	(b)	How does the baud rate affect UART communication? Which register is used to set baud rate? What value should be loaded in that register for 9600 baud rate for crystal frequency of 8 MHz?	**04**
	(c)	Discuss the role of PWM in controlling DC motors with AVR. Interface DC motor with AVR microcontroller with Motor driver chip. Write program to rotate DC motor. Interface two push-button switches at pin PD0 and PD1. Speed of DC motor should increase in step when switch connected with PD0 is pressed and should decrease when switch connected with PD1 is pressed.	**07**

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