

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 4 – EXAMINATION – SUMMER 2026

Subject Code: 3141008

Date: 06/06/2026

Subject Name: Microprocessor & Microcontroller

Time: 10:30 AM TO 01:00 PM

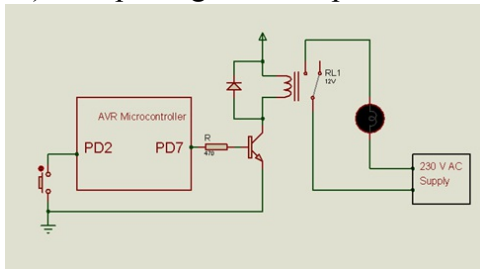
Total Marks: 70

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) Show how address bus and data bus are de-multiplexed to design 8085 microprocessor based application with help of diagram. **03**
 - (b) What is the role of DDR Register in GPIO Programming of AVR Microcontroller ? Write assembly language instructions to initialize PORT C as an input and PORT D as an output port. **04**
 - (c) Explain Architecture of AVR Microcontroller with diagram. Which registers are used as memory pointers? **07**
- Q.2**
- (a) What will be content of register R16 after execution of following instructions?
SEC
LDI R16,0x55
LSL R16 **03**
 - (b) Write assembly language program to read 8 bit value from Port C, Compare it with reference value 080 using comparison instruction, If reading is greater than 0x50, set port pin PD7 and if reading is less than or equal to 0x50, reset port pin PD7. **04**
 - (c) Explain Architecture of 8085 Microprocessor with diagram and explain important signals. **07**
- OR**
- Q.2**
- (c) What is the importance of stack memory in microcontroller? In which situation stack memory is utilized? Explain stack operations in the AVR microcontroller with example. **07**
- 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) Write assembly language program to keep monitoring port pin PC1, send byte 0x55 to PORT D if logic level of PC1 is high and 0xAA to PORT D, if logic level of PC1 is low. **04**
 - (c) Consider that Ignition Switch is connected to port pin PD1, Seat belt switch is connected to PD2, Buzzer is connected to PD6 and LED is connected to PD7. Draw schematic diagram. Write C Program for AVR microcontroller such that it turn on LED and sound buzzer if the key is in the ignition closed (PD1 at logic level LOW), but seat belt is not latched (PD2 at logic level HIGH). **07**
- OR**
- Q.3**
- (a) Explain instructions SBIS and SBIC which are used to check logic levels of port pins with example. **03**

- (b) Explain unconditional jump instructions with examples. What is the difference between JMP and RJMP instruction? 04
- (c) Push-button switch is connected with port pin PD2, Relay is interfaced with port pin PD7 as shown in the schematic diagram. Write C language program such that when switch is pressed once, electrical device should turn-on and when it is pressed second time device should turn-off (i.e. device should toggle at every switch press event). Use polling or interrupt method for the program. 07



- Q.4 (a) What are the advantages of using assembly language in time-critical applications? 03
- (b) Compare SPI and I2C protocols 04
- (c) Draw interfacing diagram to interface 16x2 LCD module with AVR Microcontroller. Explain functions of RS and E pin. Write C language program to display message “VIKAS SAPTAH ” on the LCD. 07

OR

- Q.4 (a) Write set of instructions to store bit 3 from R16 to T flag and then copy T flag into bit 5 of register R17. 03
- (b) How timer interrupts are enabled and disabled? Explain TIMSK register of AVR Microcontroller. 04
- (c) Create a temperature monitoring system using an AVR Microcontroller and a temperature sensor LM35. Draw interfacing diagram and write embedded C code for it. 07

- Q.5 (a) What is importance of monitoring UDRE flag while writing byte into UDR register during serial transmission ? 03
- (b) Explain TCCR0 timer register. What value should be loaded to TCCR0 to program Timer 0 in normal mode with external clock source (falling edge) on T0 pin? 04
- (c) Draw interfacing diagram to drive stepper motor with AVR Microcontroller port pins PD4 to PD7 with suitable interfacing circuit. Write C language program to rotate a stepper motor in clockwise direction for 10 seconds and counterclockwise directions for 5 seconds continuously using half-step control mode. 07

OR

- Q.5 (a) Explain ADC control and status register ADCSRA 03
- (b) Write C language program to control a servo motor using pulse width modulation (PWM). 04
- (c) Draw circuit diagram to interface common anode seven segment display with PORTD of AVR microcontroller. Interface two push button switches to generate external interrupts INT0 and INT1. Write C language program to display count values on seven segment display in such as way that count value should increment when external interrupt 0 is generated and count value should decrement when external interrupt 1 is generated. 07
