

# 22590

**22223**

**3 Hours / 70 Marks**

Seat No. 

--	--	--	--	--	--	--	--

- Instructions* –
- (1) All Questions are *Compulsory*.
  - (2) Answer each next main Question on a new page.
  - (3) Illustrate your answers with neat sketches wherever necessary.
  - (4) Figures to the right indicate full marks.
  - (5) Assume suitable data, if necessary.
  - (6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

- 1. Attempt any FIVE of the following: **10****
- a) Compare Harvard and Von-Neumann architecture (any 4 points).
  - b) List any four features of ATmega32.
  - c) State difference between Embedded ‘C’ and assembly language programming.
  - d) State output in PORTD after execution of each of following code in AVRC.
    - i)  $PORTD = 0X39 \mid 0X79$
    - ii)  $PORTD = 0X64 \wedge 0X9C$
  - e) List any four features of Arduino UNO.
  - f) State the use of following functions in Arduino programming
    - i) `pin mode ()`
    - ii) `digital write ()`
  - g) Draw the pin diagram of RS232 DB9 connector.

P.T.O.

- 2. Attempt any THREE of the following:** **12**
- a) Classify embedded system and state any two applications of any two types.
  - b) Draw and explain internal memory organization of AVR in microcontroller.
  - c) Write AVR 'C' program to perform logical operations AND , OR , XOR on two constant data and store the result to port D with delay of 500 milliseconds between each result.
  - d) Explain with a suitable diagram CAN bus protocol.
- 3. Attempt any THREE of the following:** **12**
- a) Identify the type of Embedded system used for following applications.
    - i) Washing machine.
    - ii) Telemedicine.
    - iii) Automobile and engine control system.
    - iv) GPS.
  - b) List alternate functions of all PORTD pins of AVR.
  - c) Describe different any for relational operators with example that are used in AVR'C' programming.
  - d) Explain the interfacing of AVR micro controller and PC using MAX232.

**4. Attempt any THREE of the following: 12**

- a) The water level of tank needs to be monitored for water level control level to ON or Off motor pump. Explain the setup for the same using AVR micro controller and write 'C' program to control level.
- b) Interface 4 switches and 4 LEDs to Arduino board and write program to control the LED's in sequence as per switch position.
- c) State the steps to generate delay using Timer 0 of AVR microcontroller.
- d) Explain following math functions used in Arduino with their syntax & ex.
  - i) sq
  - ii) pow ()
  - iii) min ()
  - iv) max ()
- e) Draw explain the frame format of  $I^2C$  protocol.

**5. Attempt any TWO of the following: 12**

- a) Explain functions of following blocks of AVR microcontroller.
  - i) Timer / counter
  - ii) Analog comparator
  - iii) ADC
- b) Write an AVR C program to blink LED connected at PORTB, pin 0 with 1 second delay using Timer 0. Assume fosc as 8 MHz and prescaling of 1024.
- c) Draw the interfacing diagram of Arduino and DC motor and write an Arduino program to rotate motor in clockwise and anticlockwise direction.

22590

[ 4 ]

**Marks**

**6. Attempt any TWO of the following:**

**12**

- a) Explain any six characteristics of Embedded system.
  - b) Interface two switches and 7 segment display to Arduino UNO.  
Draw the interfacing diagram and write program to display 0 to 9 if SW1 is pressed and display 9 to 0 if SW2 is pressed.
  - c) Identity the serial communication protocol used for personal computer and mobile phones and explain.
-