

# 22590

**23124**

**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) Assume suitable data, if necessary.  
(5) 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) List any four features of ARM microcontroller.
  - b) State the function of SDA and SCL pins of ATmega 32.
  - c) List data types of AVR C with data range of 8 bit and 16 bit.
  - d) State the output in PORT A, after execution of each of the following code in AVR C.
    - i)  $\text{PORT A} = 0 \times 54 \ \& \ 0 \times 22;$
    - ii)  $\text{PORT A} = 0 \times 46 \ \ll \ 5;$
  - e) List any four specifications of Arduino MEGA.
  - f) State the function used to define port pin as an input or output in Arduino programming.
  - g) List any four features of USB protocol.

P.T.O.

- 2. Attempt any THREE of the following :** **12**
- a) Explain with block diagram the hardware components used in Embedded systems.
  - b) Describe CAN bus with frame format.
  - c) Compare Arduino MINI and Arduino NANO boards based on the following parameters -
    - i) Processor used
    - ii) USB connector
    - iii) Flash memory
    - iv) Clock frequency
  - d) Draw and explain internal memory structure of ATmega 32 microcontroller.
- 3. Attempt any THREE of the following :** **12**
- a) Identify the following as Soft real time or Hard real time. Justify your answer.
    - i) Missile launching system
    - ii) CD player
    - iii) Space craft
    - iv) Fire extinguisher
  - b) List any eight features of ATmega 328 microcontroller.
  - c) Write 'C' program to control bank level for following conditions
    - i) Pump should turn ON when level is below low level
    - ii) Pump will turn OFF when level is above high level.
  - d) Explain bluetooth wireless interface.

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

- a) Compare the micro controllers ATmega 168 and ATmega 328 based on -
  - i) Number of pins
  - ii) Interface
  - iii) Memory size and Type
  - iv) Number of Inputs / outputs
- b) Write a program to control the speed of DC motor using PWM mode of AVR microcontroller with neat connection diagram.
- c) State the steps to generate delay using Timer 0 of AVR microcontroller.
- d) Explain following functions in Arduino with their syntax and examples
  - i) Serial.print ( )
  - ii) analogRead ( )
- e) Differentiate between wifi and Bluetooth wireless serial protocols with respect to –
  - i) Networking topology
  - ii) Range
  - iii) Power consumption
  - iv) Data Rate

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

- a) Explain  $DDP_x$  and  $PIN_x$  registers used in ATmega 32 with suitable diagram.
- b) Write a AVR program to flash an LED every 12 ms. Consider CPU clock frequency of 8 MHz using timer 0 and prescalar = 1024.
- c) Draw the connection diagram to interface stepper motor with Arduino (UNO) board and write a program to rotate the motor in clockwise direction.

22590

[ 4 ]

**Marks**

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

**12**

- a) Explain -
    - i) sophisticated embedded system and
    - ii) reactive embedded system in detail.
  - b) Identify the serial communication protocol used for the communication between a computer and a modem using 9 pin connector. Specify the sequence of operations (Hardware Handshakings) to be carried out to send the data from computer to modem.
  - c) Draw the interfacing diagram of seven segment display with Arduino (UNO) and write a program to print numbers.
-