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3 Hours / 70 Marks   Seat No. ☐☐☐☐☐☐☐☐

Instructions –   (1) All Questions are *Compulsory.*

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(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 <u>FIVE</u> of the following :**   **10**

a) List any four features of PIC microcontroller.

b) Sketch the ADC block of AVR micro-controller, A Tmega32.

c) List data types used in ARM microcontroller.

d) State the output in PORT A after execution of each of the following code in AVR C.

i)   PORT A = 0 × 95 : 0 × 46 ;

ii)   PORT A = 0 × 32 ^ 0 × 28 ;

e) List any four specifications of Arduino UNO.

f) State the need of setup function in Arduino programming.

g) List any four features of bluetooth communication protocols.

Marks

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

   a) Explain with the block diagram of hardware components used in Embedded Systems.

   b) Explain the format of anyone register of AVR microcontroller with a suitable diagram.

   c) Compare Arduino UNO and Arduino MEGA boards on the basis of –

     i) Processor used

     ii) Flash memory

     iii) No. of analog and digital I/O pins

     iv) Clock frequency

   d) Explain with a suitable diagram the frame format of I2C bus with master as transmitter.

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

   a) Identify the following as soft real time or hard real time embedded system. Justify your answer.

     i) ATM machine

     ii) Space craft

     iii) Flight Autopilot control

     iv) Missile launching system

   b) List the alternate functions of all PORT B pins of AVR.

   c) Compare Embedded C and Assembly language programming based on –

     i) Execution Time

     ii) Memory requirement

     iii) Time for coding

     iv) Debugging

   d) Sketch the interfacing diagram of AVR microcontroller and PC using MAX232 and explain it.

Marks

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

a) The temperature of a battery needs to be continuously monitored for protection from overheating. Explain with the suitable set up for the same wing AVR microcontroller.

b) Write a program to blink the LED using PWM mode of AVR microcontroller with neat connection diagram.

c) State the steps to generate delay using timer 1 of AVR microcontroller.

d) Explain following function in Arduino with their syntax and examples.

   i) Pinmode ( )

   ii) Sqrt

e) Compare synchronous and asynchronous serial communication based on any four points.

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

a) Explain the internal memory organization of AVR microcontroller, ATmega 32 with suitable diagram.

b) Write an AVR C program to generate a square waveform of frequency 50 Hz at PORT B, 2nd pin using Timer O. Assume oscillator frequency as 8 MHz and a prescalling of 1024.

c) Draw the connection diagram to interface board and write a program to rotate the motor in clockwise direction.

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

a) Classify embedded systems and explain with diagram.

b) Draw the interfacing diagram of the 16 × 2 LCD module with Arduino and write a program to display "MSBTE".

c) Identify the serial communication protocol used to send the information from and to the Electronic control units in a car. Draw its frame format.

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