

17658

15116

3 Hours / 100 Marks

Seat No.

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- 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) Use of Non-programmable Electronic Pocket Calculator is permissible.
- (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

1. a) Attempt any THREE of the following: 12
- (i) List ports of 89C51 microcontroller and list alternative functions of port-3 pins.
- (ii) List any four different hardware units in embedded system. Write function of any two of them.
- (iii) Draw and explain CAN bus protocol.
- (iv) Draw the pin diagram of 14 pin LCD display. State any function of each pin.
- b) Attempt any ONE of the following: 6
- (i) Explain the classification of an embedded system.
- (ii) State the scheduling algorithms of RTOS and describe the concept of round robin scheduling.

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**Marks****2. Attempt any FOUR of the following:****16**

- a) Draw the internal data memory structure of 89C51 and describe register banks.
- b) Write the steps for programming 8051 microcontroller to receive data serially.
- c) Draw the pin-out of RS232C and describe the function of TXD, RXD, DTE and DCE.
- d) Draw the interfacing diagram of  $4 \times 4$  matrix keyboard with 89C51 microcontroller.
- e) State the methods of task synchronization and explain any one in detail.
- f) Describe any four applications of an embedded system.

**3. Attempt any FOUR of the following:****16**

- a) Compare between CAN and I2C protocols on following points:
  - (i) Data transfer rate
  - (ii) Number of fields
  - (iii) Addressing bit
  - (iv) Application
- b) What are different logical operators in 'C' for 89C51? Give one example each (any four).
- c) State any four functions of RTOS.
- d) Classify an embedded system. Describe any two points.
- e) Draw labelled interfacing diagram to interface DC motor with 8051 microcontroller.

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**Marks**

- 4. a) Attempt any THREE of the following:** **12**
- (i) List the interrupts of 89C51 microcontroller with their vector locations and order of priority.
  - (ii) State any four features of Bluetooth Technology.
  - (iii) Describe any four specifications of RTOS. Give any four examples of RTOS.
  - (iv) Explain the meaning of following terms with reference to embedded system:
    - 1) Inter task communication
    - 2) Multi-tasking
- b) Attempt any ONE of the following:** **6**
- (i) Write 89C51 'C' program to transfer the message "INDIA", serially at 9600 baud rate continuously. Use 8 bit data and 1 stop bit.
  - (ii) Draw the interfacing diagram of DAC with 89C51 microcontroller. Write a program in 'C' language to generate positive ramp voltage.
- 5. Attempt any FOUR of the following:** **16**
- a) Describe how assembly language instructions can be included in 89C51 'C' program.
  - b) Differentiate synchronous and asynchronous communication (any four points).
  - c) Draw labelled interface diagram to interface LED to P2.1 of 89C51. Write 89C51 'C' program turn ON and OFF this LED after some delay.
  - d) Explain the concept of starvation and deadlock in RTOS.
  - e) Describe the program downloading tools ISP/IAP.
  - f) Draw the interfacing diagram of ADC with 8051 microcontroller.

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**Marks****16****6. Attempt any FOUR of the following:**

- a) Compare between assembly language program with an embedded 'C' with reference to following points:
    - (i) Execution time
    - (ii) Time for coding
    - (iii) Hex file size
    - (iv) Debugging
  - b) Draw and explain USB protocol.
  - c) Draw the interfacing diagram of stepper motor with 8051 microcontroller.
  - d) Draw the interfacing diagram of LCD display with 8051 microcontroller.
  - e) Write 89C51 'C' program to toggle bits of port P $\phi$  continuously with a 200 millisecond delay.
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