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**15116****3 Hours / 100 Marks**

Seat No.

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**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.

**Marks****1. (A) Attempt any THREE of the following :****12**

(a) State difference between Harvard and Von Neumann architecture with suitable diagram.

(b) List important any eight features of 8051 microcontroller.

(c) Explain the following 8051 microcontroller instructions :

(i) XCH A, @ Ri

(ii) CJNE A, direct, rel

(d) State any two difference between microcontroller and microprocessor.

(e) Explain BSR mode of 8255. Write control word in BSR mode to set, Reset of PC<sub>4</sub> bit of Port C.**(B) Attempt any ONE of the following :****6**

(a) Write an assembly language program to exchange ten bytes of data from source location 40H to destination location 60H, for 8051 microcontroller.

(b) Draw Interfacing of 2 Kbyte EPROM and 2 Kbyte RAM to 8051 microcontroller. Draw the memory map.

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

(a) Describe the function of address, data and control bus.

(b) Draw the format of PSW register of 8051 microcontroller and state the function of each bit.

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- (c) Describe the function of following pins of 8051 microcontroller :
- (i)  $\overline{\text{PSEN}}$
  - (ii)  $\overline{\text{EA}}$
  - (iii) RST
  - (iv) ALE
- (d) Draw Internal RAM memory organization of 8051 and explain.
- (e) List addressing modes of 8051 microcontroller. Explain any four with one example each.
- (f) Explain the following directives with example :
- (i) ORG
  - (ii) DB
  - (iii) EQU
  - (iv) CODE

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

- (a) Distinguish between microprocessor and microcontroller on the basis of following points :
- (i) Architecture used
  - (ii) Memory organization
  - (iii) Ports
  - (iv) Clock frequency
- (b) Explain power saving options with diagram.
- (c) State the function of Editor, Assembler, Compiler and Linker.
- (d) Describe selection factors of microcontroller.
- (e) Draw Architecture of 8051 microcontroller.

**4. (A) Attempt any THREE of the following :****12**

- (a) With the help of ANL instruction explain :
- (i) Direct Addressing Mode
  - (ii) Indirect Addressing Mode
  - (iii) Register Addressing Mode
  - (iv) Immediate Addressing Mode

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- (b) Draw the format of SCON register. Explain any two modes of serial communication.
- (c) Write an assembly language program to transfer the message "MIC" serially at 4800 baud, 8 bit data, 1 stop bit. Do this continuously.
- (d) Write an assembly language program to find two's complement of a number 55H, and store the result in the memory location 3000H.

**(B) Attempt any ONE of the following :** **6**

- (a) Draw the interfacing diagram of stepper motor with 8051 microcontroller and write an assembly language program to rotate stepper motor continuously in counter clockwise.
- (b) Write an assembly language program for 8051 to arrange ten numbers in an ascending order.
- (c) Draw interfacing diagram showing 4×4 matrix keyboard connections to Port 2 and Port 1 of 8051 microcontroller. Draw flow-chart to detect a pressed key.

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

- (a) List the various interrupts in 8051 microcontroller along with their priorities and vector locations.
- (b) A switch is connected to pin P1.0 and LED to pin P2.7. Write a program to get the status of the switch and send it to the LED.
- (c) Draw the circuit diagram of Port 2 of 8052 and describe its function.
- (d) Draw the format of TCON register and state the function of each bit.
- (e) List the timer modes of 8051 microcontroller. Describe any two timer modes with a suitable diagram.

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

- (a) Write a program to generate a square wave of 50 Hz frequency on pin P1.2, using an interrupt for Timer 0. Assume that XTAL = 11.0592 MHz.
- (b) Describe the steps for programming the 8051 to receive data serially.

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- (c) Draw the format of IE and IP register.
  - (d) Explain the timer/counter logic with diagram.
  - (e) Draw the interfacing diagram of seven segment display with 8051 microcontroller.
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