3 Hours/100 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) **Use** of Non-programmable Electronic Pocket Calculator is **permissible**.

MARKS

1. A) Attempt **any three** :   **12**

    a) Compare Von-Neumann and Harvard architecture. Give examples.   **4**

    b) State important selection factors of microcontroller for microcontroller based system.   **4**

    c) Draw internal RAM organisation of 8051 microcontroller.   **4**

    d) Distinguish between assembler, cross compiler and compiler.   **4**

    e) Draw control word format of 8255 for BSR mode and write control word to set bit PC7.   **4**

   B) Attempt **any one** :   **6**

    a) Write an ALP for 8051 microcontroller to copy block of ten bytes of data from RAM location starting from 35 H to RAM location starting at 60 H.   **6**

    b) Draw interfacing diagram of 8051 microcontroller with 8255. State I/O port address and control word register address.   **6**

2. Attempt **any four** :   **16**

   a) Describe power saving options of 8051 microcontroller.   **4**

   b) Describe functions of following pins of 8051 microcontroller.   **4**

      i) $\overline{PSEN}$ ii) ALE

      iii) $\overline{EA}$ iv) RST

   c) State any three derivatives of 8051 and compare. (Any three points).   **4**

   d) State alternate functions of port 3 pins of 8051 microcontroller.   **4**

   e) Draw format of PSW register of 8051 microcomputer and state function of each flag.   **4**

   f) Differentiate between microcomputer and microcontroller. (any four points).   **4**

3. Attempt **any four** :   **16**

   a) Draw and explain software development cycle.   **4**

   b) State any four addressing Modes of 8051 microcontroller and explain with examples.   **4**

   c) State necessity of assembler directives. List any four assembler directives and describe with example.   **4**

   d) Write a program to find the sum of data stored at five consecutive memory locations starting from 40H. Store lower byte in A and higher byte in R7.   **4**

      Assume data 40 H = (7 D) 41 H = (EB)

      42 H = (C 5) 43 H = (5 B) 44 H = (32)

   e) Draw format of SFR SCON and explain each bit of same.   **4**

MARKS

4. A) Attempt **any three** : 12

    a) Describe following 8051 microcontroller instructions : 4

      i) LJMP addr   ii) SJMP addr

      iii) RL A   iv) RR A

    b) Write a ALP for 8051 microcontroller to receive bytes of data serially and put them in Port P1. Assume Baud Rate 4800, 8 Bit data, 1 Stop Bit. 4

    c) Explain modes of serial communication in 8051 microcontroller. 4

    d) What values should be loaded in TH1 of 8051 microcontroller to obtain 4800 Baud rate ? Assume crystal freqn. = 11.0592 MHz. Give answer in both decimal and Hex. 4

B) Attempt **any one** : 6

    a) Assume internal RAM memory contains following data. Write 8051 ALP to search for value equal to 65. If value 65 does exist in the table then store it in R4. If value does not exists in table then make R4 = 0.

      Data : 40 H = (76) ; 41 H = (79) ; 42 H = (rg) 43 H(65) ; 44 H = (62). 6

    b) Draw interfacing diagram of stepper motor with 8051 microcontroller and write ALP to rotate in anticlockwise direction through 180°. Assume step angle 1.8°. 6

    c) Draw interfacing diagram of 2K byte EPROM and 2K RAM to 8051 microcontroller. Draw memory map. 6

5. Attempt **any four** : 16

    a) Draw timer/counter control logic diagram of 8051 microcontroller. 4

    b) Write an ALP for 8051 microcontroller to generate a delay of 1 second by using timer 1. Assume crystal freqn. = 12 MHz. 4

    c) Draw format of IE SFR and describe each bit. 4

    d) Write a (A.L. ALP program) for 8051 microcontroller to transfer letter 'A' serially at 4800 baud continuously. 4

    e) Describe function of SBUF register for serial communication in 8051 microcontroller. 4

MARKS

6. Attempt **any four** : 16

   a) Draw format of IP SFR of 8051 microcontroller and describe each bit. 4

   b) Write an ALP to generate continuous Square wave of 2KHz freq. on pin P 1.5, using timer 0. Assume crystal freqn. = 11.0592 MHz. 4

   c) Differentiate between polling and interrupt approach to generate a time delay by using 8051 microcontroller (any two points). 4

   d) Differentiate between linear and absolute address decoding technique. (any 4 points). 4

   e) Describe the function of address, data and control bus. 4

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