22426

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) 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) State any four important features of 8051 microcontroller.

b) Find out the number of address lines required to access 4 KB of RAM.

c) List out any two instructions of following addressing modes:

(i)   Immediate addressing

(ii)   Register addressing.

d) Draw the format of SCON register.

e) Compare 8951 and 8031 derivatives of 8051 on the basis of:

(i)   RAM in bytes

(ii)   Timers used.

f) Draw interfacing diagram of 4x4 keyboard matrix with 8051 microcontroller.

g) Define the term BUS related to microprocessor/controller and list different buses used in microcontroller.

Marks

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

a) Draw the interfacing of stepper motor and write an ALP to rotate in anticlockwise direction.

b) Describe power down mode and ideal mode of 8051 with circuit diagram. Which SFR is used to set these modes and draw the same.

c) State the alternative functions of port 3 of 8051 microcontroller.

d) Sketch interfacing diagram of 2 Kbyte RAM and 2 Kbyte EPRAM to 8051. Draw the memory map .

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

a) Draw the format of PSW register of 8051 microcontroller and explain the function of each bit.

b) Develop an ALP to generate square wave of 2 kHz on port pin P2.1 generate delay using timer 0 in mode 1. Assume crystal frequency of 11.0592 MHz.

c) State and explain the need of the following development tools microcontroller board:

   (i)   Editor

   (ii)   Assembler

   (iii) Compiler

   (iv)   Linker

d) List software and hardware interrupts used in 8051 with their vector addresses and priorities.

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

a) Develop an 8051 based system for traffic light controlling. Draw interfacing diagram and write ALP for the same.

b) Compare Von–Neumana and Harvard Architecture (any four points).

c) List different timer modes of 8051 microcontroller and describe mode 2 with neat sketch.

d) Explain the interfacing diagram of DAC to 8051. Write an ALP to generate triangular waveform using DAC.

Marks

e) Develop an ALP to transmit message "MSBTE" serially at baud rate 4800 8 bit data, 1 stop bit. Assume crystal frequency of 11.0592 MHz.

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

a) Explain the various selection factors of microcontroller suitable for application.

b) Develop a program to transfer block of 05 numbers. From memory location 50 H to 60 H.

c) Sketch 8051 interfacing diagram to interface 4 LED's and 4 switches. Interface switches to port O and LED to port 1 upper nibble. Develop an ALP to read status of switches and operate LED's as per switch status.

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

a) Develop an ALP to read temperature from LM 35 sensor. Draw the interfacing diagram with 8051.

b) Develop a program to toggle the LED's after every 500 m sec connected to P1.0 and P1.1 after receiving the external interrupt on INTO.

c) Explain the following instructions.

SWAP A

ADD C

MUL AB

CJNE A, add, radd

MOV A, Ro

MOVX A, @ A + DPTR.

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