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3 Hours / 100 Marks Seat No. | | | | | | | | |

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. Attempt any FIVE of the following: **20**

a) Describe the following pins of 8051 microcontroller.

(i) TXD

(ii) RXD

(iii) $\overline{INT_0}$

(iv) $\overline{INT_1}$

b) Give example for 8051 microcontroller as a Boolean processor.

c) List various addressing modes of 8051 microcontroller along with one example of each.

d) Write an assembly language C language program of 8051 microcontroller for adding ten numbers in an array. Assume suitable data.

P.T.O.

Marks

e) With proper format, describe the interrupt Priority (IP) register.

f) Describe the steps in the embedded software development cycle.

g) Describe the concept of Round Robin Scheduling with reference to real time operating system (RTOS)

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

a) Write important features of 8051 microcontroller.

b) Write the instruction to exchange databytes at address 40H and 50H using assembly language programming or C language programming.

c) Write an assembly language program or C language to generate a square wave of 1kHz at port pin 1.5 using auto reload mode of Timer O.

d) Draw the pin out of 14 pin LCD display and state the function of following:

(i) RS

(ii) R/W

(iii) EN

e) State the function of the following:

(i) Compiler

(ii) Debugger

(iii) Simulator

(iv) Emulator

f) Differentiate between Desktop operating system and Real time operating system based on following parameter:

(i) Time Behaviour

(ii) Application

(iiii) Kernel

(iv) Delays

(v) Example

Marks

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

a) Compare data memory and program memory with respect to 8051 microcontroller on following parameter

(i) Usage

(ii) Signals for interfacing

(iii) On chip size

(iv) Extendable memory

(v) Pointers used

b) Give complete classification of JUMP instruction.

c) How will you implement single step operation in IC 8051.

d) Draw interfacing of ADC 0808 with microcontroller 8051.

e) Describe the cross assemblers and cross complier in brief.

f) State the method of task synchronization and describe any one in detail.

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

a) Describe the $\overline{\text{PSEN}}$, $\overline{\text{EA}}$, ALE and RST of 8051 IC.

b) Explain the following 8051 instructions:

(i) SETB C

(ii) ADD A; @ RO

(iii) CJNE A, direct adder, label

(iv) XCHDA, @ R1

c) Describe the operating modes of serial port of 8051 microcontroller.

d) Write an assembly language program to generate a saw tooth wave form when DAC is interfaced with 8051 microcontroller.

e) State the function of Locator and Loader.

f) Describe the concept of mutual exclusion.

Marks

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

a) Describe the function of XTAL1, XTAL2, T0 and T1 pins of 8051 microcontroller

b) Write a program to find 2's complement of databyte stored in location 20H.

c) Give data to enable serial interupt, timer O and external hardware interupt 1.

d) Write a program in C or assembly language for generating fine wave with interface of DAC along with IC8051 microcontroller.

e) Describe the four advantages of an embedded system.

f) State the concept of Simaphores in real time operating system (RTOS).

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

a) State the function of Program Counter (PC) and Data Pointer (DPTR) in 8051 microcontroller.

b) Write an assembly language program for the 8051 microcontroller to rotate two 8 bit numbers stored at memory location 20H and 21H. Sore the product at 22H and 23H.

c) Describe the difference between the timer and counter operation of 8051 microcontroller.

d) Draw the labelled schematic of stepper motor interface to 8051 microcontrollers port and give bit patterns for full stepping.

e) State different hardware units of embedded system.

f) State any four applications of Real Time Operating System (RTOS)