



# 17626

11718

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.*

**Marks**

1. Attempt any 5:

20

- a) List different interrupts in  $\mu\text{c}$  8051 with their priorities and vector addresses.
- b) Draw and explain the format of PSW Special Function Register.
- c) List the different addressing modes of  $\mu\text{c}$  8051 and explain any one in detail.
- d) Write a program in assembly or 'C' language to get data 'AA' from Port '0' and sent it to Port '1' of  $\mu\text{c}$  8051.
- e) Draw and label interfacing diagram of  $16 \times 2$  LCD with  $\mu\text{c}$  8051.
- f) Enlist any eight examples of embedded system.
- g) Differentiate between RTOS and Desktop OS.

2. Attempt any 4:

16

- a) Draw and label pin diagram of  $\mu\text{c}$  8051.
- b) List the ports available in  $\mu\text{c}$  8051 and state alternate functions of Port '3'.
- c) List the types of instructions available for  $\mu\text{c}$  8051 and write one example of each type.
- d) Write a program in assembly or 'C' language to send the message 'MSBTE' serially at 4800 baud rate, 8 bit data and 1 stop bit continuously.
- e) Draw interfacing diagram of  $4 \times 4$  keypad with  $\mu\text{c}$  8051 and label it.
- f) Write a program in 'C' or assembly language to add two 8 bit numbers.

**P.T.O.**

**3. Attempt any 4 :****16**

- a) For an  $\mu\text{c}$  8051 system of 11.05g MHz, find number of clock cycles and time required to execute each instruction :
- i) MOV R3, # 55 h
  - ii) DEC R3
  - iii) LJMP NEXT
  - iv) MUL AB
- b) Draw and label schematic diagram of Port '0'.
- c) Draw and explain the format of IP and IE registers.
- d) Write a program in assembly or 'C' language to send continuously 'OOH' and 'FFH' alternatively to the Port 'P1'.
- e) Explain interprocess communication in an RTOS.
- f) Draw and label interfacing diagram of ADC with  $\mu\text{c}$  8051.

**4. Attempt any 2 :****16**

- a) Draw and explain the formats of TCON and TMOD registers.
- b) Draw and label interfacing diagram of stepper motor with  $\mu\text{c}$  8051. Write a step sequence for half stepping and full stepping.
- c) Enlist hardware and software development tools for embedded system. Explain any 1 tool from each group.

**5. Attempt any 4 :****16**

- a) Explain task synchronisation and Mutual Exclusion in RTOS.
- b) Explain need and requirement of RTOS in an embedded system.
- c) Explain the following instructions with one example each :
- i) RLC
  - ii) RRC
- d) Write the program in 'C' OR assembly language to generate square wave of 50% duty cycle on bit '0' of Port '1'.
- e) Explain the concept of starvation and Deadlock in RTOS.
- f) Write a program in 'C' or assembly language to get bit at P1.0 and send it to P2.7 after inverting it.

**6. Attempt any 4 :****16**

- a) Write the steps to program Timer '1' in Mode '1'.
- b) Explain following instructions with one example each (i) SWAP (ii) CPL (iii) CLR (iv) SETB.
- c) Explain System On Chip (SOC) in embedded system.
- d) Draw and label interfacing diagram of DAC with  $\mu\text{c}$  8051.
- e) State the steps to write and execute the program by using Keil or SPJ software.
- f) Draw flowchart of software development cycle in embedded system.
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