

Roll Number:

ANNA UNIVERSITY- CHENNAI – UNIVERSITY DEPARTMENTS

**B. E. (Full Time) DEGREE END SEMESTER EXAMINATIONS
IV SEMESTER (Regulations 2008), April 2011
Computer Science and Engineering**

CS 9251: MICROPROCESSORS AND MICROCONTROLLERS

Time: Three Hours

Maximum Marks: 100

Answer All Questions

PART-A (10 X 2 = 20 Marks)

1. Write an 8085 program to swap the two nibbles of the accumulator.
2. Differentiate between a clock cycle, a machine cycle and an instruction cycle in 8085. List down the machine cycles involved in the execution of the LDA ADDR instruction of 8085.
3. Discuss the use of the EVEN and EXTRN assembler directives.
4. Write an 8086 program snippet that finds whether a given character is available in a string or not.
5. Discuss the use of the RQ / GT signal. When will the processor not give up control of the busses?
6. What is the role of the bus controller in a maximum mode configuration?
7. Distinguish between the N-key rollover and the 2-key lockout modes of operation of the programmable keyboard / display controller.
8. Show how the programmable interval timer, 8253 can be used to notify the processor after 50 μ secs. Assume a clock frequency of 5MHz.
9. Show how the 8051 microcontroller accesses external data memory.
10. Assume that port P1 of 8051 is connected to a temperature sensor. Write a program to read the data through P1 and compare it with a threshold value. If it is above the threshold, move it into register R0. If it is below the threshold, move it into register R1.

PART-B (5 X 16 = 80 Marks)

11. i. Discuss the architecture of the 8086 processor with a neat diagram. (10)
- ii. Write an 8086 program to sort an array of numbers in the ascending order. (6)

12. (a) i. Write an 8085 assembly language program to generate the multiplication tables from 1 to 10 (1x1, ..., 1x10, ..., 10x10). Use this table and get the product of two numbers, given the multiplicand and the multiplier. (10)

- (a) ii. Discuss the interrupt structure of 8085. Assume that the 8085 processor receives an interrupt request on RST 5.5. This is followed by TRAP and RST 7.5 while it is still executing the RST 5.5 interrupt. Discuss how the processor will handle this situation. (6)

(OR)

- (b) i. Write an 8085 assembly language program to simulate a 2-digit BCD down counter. (10)

- (b) ii. Show how a 16K RAM starting from 8000H, a 2K ROM starting from 0000H, an input port at 45H and an output port at 54H can be connected in an 8085 based computer system. Discuss the decoding logic and the signals involved. (6)

13. (a) A multiprocessor system consists of 2 modules with the following specifications:

Module 1 : 8086 with a local bus
Module 2 : 8086 and an 8087 with a local bus

Draw a detailed block diagram showing the various components required and indicate the interconnections between the various components. Explain briefly how co-ordination and communication take place between the various masters.

(OR)

- (b) i. Discuss the interrupts of 8086. (10)
- (b) ii. Define a macro for moving an arbitrary character string that ends with a null character from one string of bytes in memory to another. (6)

14. (a) i. With a neat diagram, discuss the operation of the USART, 8251. (10)
- (a) ii. Discuss any four operating modes of the Programmable Interrupt Controller, 8259. (6)

(OR)

(b) i. With a neat diagram, show how the 8257 DMA controller can be interfaced in an 8085 based system. Discuss clearly the signals involved.

What are the changes that need to be brought in if you consider an 8086 based computer system? (10)

(b) ii. Show how two 8255s can be connected together to form a 16-bit parallel interface that can be used for data transfer with an 8086 processor. (6)

15. (a) i. Discuss the architecture of the 8051 microcontroller with a neat diagram. (10)

(a) ii. Write an 8051 assembly language program to reverse the bits contained in the A register. (6)

(OR)

(b) Design an 8051 based washing machine controller. State the assumptions made. Show the hardware interface and the required 8051 program.
