2014

Computer Architecture and System Software

Time Alloted : 3 Hours *Full Marks : 70*

The figure in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable

GROUP - A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following: 10x1=10

i) The contents of a Base Register may be changed in _____ mode.

a) User b) Privileged
c) Safe d) None of the above

ii) An arithmetic left shift

a) Multiplies a signed number by 2
b) Divides a signed number by 2
c) Multiplies a signed number by 4
d) Divides a signed number by 4

iii) Number of address lines required for access of 1MB memory is

a) 17 b) 18 c) 19 d) 20

iv) A _____ is a complete CPU on a single chip.

a) Microprocessor b) Micro-controller
c) Control Unit d) ALU

v) 8085 has a total of _____ registers.

a) 10 b) 11 c) 12 d) 13

vi) ADD is a _____ address instruction.

a) Zero b)One c)Two d) Three

vii) The 8085 instruction to transfer a data to a register in immediate mode is _____

a) MOV b) MVI
c) LOAD d) None of these

viii) _____ calculates the address of the next microinstruction to be executed.

a) Program Counter
b) Address computation circuit
c) Instruction register
d) None of these

ix) The minimum time elapsed between two read requests is called

a) Access time b) Cycle time
c) Turnaround time d) Waiting time

x) Division by zero causes an error of class

a) Trap b) Timer Interrupt
c) I/O Interrupt d) Hardware failure

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. 3x5=15

2. Draw a 4 - bit Adder - subtractor circuit and explain its function. 5

3. Draw and explain the common bus system for 4 registers using 4 x 1 MUX. 5

4. What are Direct and Indirect address? Explain with example.

5

5. Make a list of registers for the basic computer, indicating the function of each register.

5

6. What is Instruction cycle? What are the different phases of this cycle.

2+3

7. Write an Assembly language program to add two numbers.

5

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. 3x15=45

8. a) What will be the content of the Program Counter after fetching 8bit / 16bit data from a memory location 3065H. The instruction to fetch the data resides at 5132H. Assume the instruction length to be 3 bytes.

   b) Why are interrupts considered to be a useful mechanism in the context of improving the efficiency of processing?

   c) What are the steps for a simple instruction cycle? Explain Fetch Cycle and Indirect Cycle using Register Transfer Language.

2+3+(2+8)

9. Draw and explain one stage of an ALU with shift capability along with the micro-operations performed.

[15]

10. a) What do you mean by packing? Given two decimal digits 5 and 9, show the packing procedure through proper steps.

    b) What is an Instruction Set?

    c) Convert the following expression into Reverse Polish Notation

and show the evaluation procedure in the stack organized CPU:

A x B + C x (D+ E)

(2+5)+2+6

11. a) Explain the Programmed Input/Output with a flow chart. 8

b) Draw the logic diagram of a binary cell and explain its working. 8+7

12. Write short notes on any three of the following: 5x3 = 15

a) Cache Memory

b) Arithmetic Pipelining

c) Program Counter

d) RIM and SIM instructions

e) Flag Register in 8085