

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 1471

Roll No.

--	--	--	--	--	--	--	--	--	--

**M.C.A.**

(SEM. II) THEORY EXAMINATION 2010-11

**COMPUTER ARCHITECTURE AND  
MICROPROCESSOR**

*Time : 3 Hours*

*Total Marks : 100*

**Note :—** (1) Attempt **ALL** questions. All questions carry equal marks.

(2) Assume suitable missing data and specify it clearly.

1. Attempt any **two** parts of the following : **(10×2=20)**

(a) Describe parallel computing. Why do we need parallel computers ? Give one analogy to explain your answer.

(b) Explain the Feng's classification of computer architectures in detail.

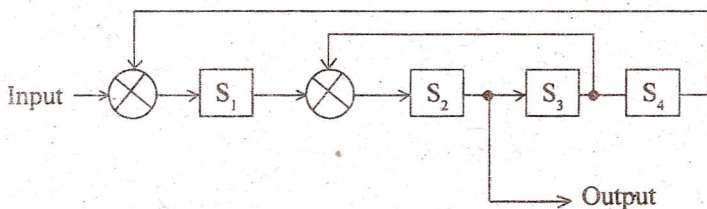
(c) (i) Machine A has a clock cycle time of 2 ns and a CPI of 4.0 for a program and Machine B has a clock cycle time of 2 ns and a CPI of 1.2 for the same program. Which machine is faster and by how much ?

(ii) Explain the role of data flow graphs in parallel computing.

2. Attempt any **two** parts of the following : **(10×2=20)**

(a) Compare the advantages and disadvantages of the S-access and C-access memory organizations for pipelined vector accessing.

- (b) Consider the following pipelined processor with four stages. All successor stages after each stage must be used in successive clock periods.



- (i) Write out the reservation table for this pipeline with six columns and four rows.
- (ii) Show the initial collision vector.
- (iii) Draw the state diagram which shows all possible latency cycles.
- (iv) What is the value of the minimal average latency (MAL)?
- (c) (i) Implement the dot-product operation with internal data forwarding between a multiply unit and an add unit.
- (ii) Write notes on SIMD array processors.
3. Attempt any two parts of the following : (10×2=20)
- (a) Compare the Butterfly networks, hypercube networks and shuffle exchange network in terms of switches elements, diameters, Bisection widths and edges/nodes.
- (b) Give parallel algorithm of  $O(n \log_2 n)$  for matrix multiplication. Show the allocation of the elements of two  $4 \times 4$  matrices in a 4-cube of 16 PES.

- (c) Construct a 64-input omega network using  $4 \times 4$  switch modules in multiple stages. How many permutations can be implemented directly in a single pass through the network without blocking ?
4. Attempt any two parts of the following : (10×2=20)
- (a) Explain various multiprocessor scheduling strategies.
- (b) Draw data flow graphs to represent the following computations :
- (i) if  $(a = b)$  and  $(c < d)$   
 then  $c \leftarrow c - a$   
 else  $c \leftarrow c + a$
- (ii) For  $i \leftarrow 1$  to  $m$  do  
      $c[i] \leftarrow 0$   
     for  $j \leftarrow 1$  to  $n$  do  
          $c[i] \leftarrow c[i] + a[i, h] * b[j]$ .
- (c) Discuss the register set of intel 16 bit microprocessor.
5. Attempt any four parts of the following : (5×4=20)
- (a) Explain the difference among the machine language, assembly language and high level language.
- (b) Explain the functions of ALE and  $IO/\overline{M}$  signals of the 8085 microprocessors.
- (c) Write a assembly language program of 8085 to performs the following :
- (i) Load the number 8BH in register D.
- (ii) Load the number 6FH in register C.

- (iii) Increment the contents of register C by one.
- (iv) Add the contents of registers C and D and display the sum at the outport PORT1.
- (d) What are the control signals necessary in memory-mapped I/O ? Explain.
- (e) Explain the functions of the following routine :

LXI SP, STACK

PUSH B

PUSH D

POP B

POP D

RET

- (f) What is the advantage of using assembly language instead of writing a program directly in machine language ?