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BICS-025

B.Tech. – VIEP – COMPUTER SCIENCE AND ENGINEERING (BTCSVI)

00545

Term-End Examination

June, 2019

BICS-025 : ADVANCED COMPUTER ARCHITECTURE

Time : 3 hours *Maximum Marks : 70*

Note : *Answer any* ***seven*** *questions. All questions carry equal marks.*

1. (a) Consider the following instructions of a program :

I_1 : x = a + b

I_2 : y = b + c

I_3 : b = z + x

I_4 : i = a ÷ j

List the pairs of the instructions (e.g. one pair is $\{I_1, I_2\}$) that cannot be executed in parallel. Give reason in support of your answer. *5*

(b) What is the role of a clock in a single processor and multiprocessor computer system ? Explain with the help of an example of each. *5*

2. Assume that a processor is using four state instruction pipelining having the stages :

IF → Fetch the instruction

DE → Decode the instruction

OP → Operand fetch

EX → Execute and store result

This processor is executing following sequence of statements :

```
LOAD A,[M]      ; Load register A from memory
LOAD B,[MH]     ; Load register B from memory
CMP A,B         ; Compare registers A and B
JMPP X          ; Jump to instruction X
                  if CMP result Positive;
STR [M + 2],B   ; Store B in memory
JMP Y           ; Jump unconditional to Y;
X : STR [M + 2],A ; Store A to memory
Y : Other instructions
```

Show how these instructions can be executed using the pipelining as given above. Also explain the problem of pipelining while executing these instructions. *10*

3. Explain the following classification of computer giving example or diagram : *3+4+3=10*

(a) SIMD

(b) MIMD

(c) SISD

4. (a) An analysis requires multiplication of very large matrices. Which type of computer will you suggest for them ? Give reason in support of your answer. *3*

(b) What is a systolic array ? Explain its use. *3*

(c) Differentiate between dataflow computer and control flow computer. *4*

5. Why do you use crossbar switch and multiport memory ? How are they different from each other ? Explain their use with the help of a diagram. *10*

6. (a) Define various fixed point and floating point operations that can be executed by an arithmetic pipelining, with the help of an example. Describe various stages/operations that should be part of arithmetic pipeline. *7*

(b) Define the term speedup for a pipelined processor. *3*

7. (a) What are the differences in parallel algorithms and algorithms written for Von Neumann machine ? Explain with the help of an example. *6*

(b) Differentiate between static and dynamic interconnection networks. *4*

8. Explain the following with the help of an example/diagram : $4 \times 2\frac{1}{2} = 10$

(a) Hypercube routing

(b) Loosely coupled microprocessor

(c) Data buffering

(d) Data flow graph