

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- October 2017

B.Tech/ M.Tech I Semester

COURSE CODE: 10M11CI114

MAX. MARKS: 25

COURSE NAME: High Performance Computer Architecture

COURSE CREDITS: 3

MAX. TIME: 1Hr 30 Min

*Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

**Q1.**

[1 x 5 = 5]

- Explain and compare mesh and torus mesh interconnected network?
- Which prediction technique will be preferred for short jump and why?
- Explain advantages of correlation bit prediction techniques over 1 bit predictor for branch prediction?
- Explain difference between pipelining and dynamic scheduling for execution of dependent instructions.
- Design a hyper cube and hyper tree for 16 nodes?

**Q2.** Design a pipeline for given set of instructions? Find CPI, speedup over sequential and average CPI for set of instruction given below.

[Marks 5]

- Assume that **forwarding** has been implemented.
- We will predict that any branch instruction is **taken**.
- Branch or jump are resolved after the EX stage.
- Provided 4 ADD type execution module for ADD and SUB, 6 executional modules for DIV and MUL.
- Where ADD and SUB takes 4 cycles, DIV takes 40 cycles and MUL takes 20 cycles.

ADD \$5, \$2, \$4  
SUB \$3, \$5, \$4  
DIV \$9, \$3, \$6  
MUL \$4, \$3, \$5  
SUB \$7, \$4, \$3  
MUL \$1, \$2, \$8

**Q3.** Design dynamic schedule using Tomasulo's technique for given set of instructions and find speedup and average clock cycles required:

[Marks 5]

LW R2, 2(\$4)  
LW R1, 2(\$6)  
ADD R1, R2, R3  
DIV R2, R5, R1  
SUB R1, R2, R4  
MUL R10, R11

Consider 2Load, 2 ADD, 1 MUL and 1 Divide modules, where Load takes 2 cycle, ADD takes 2 Cycles, MUL take 10 cycles, and DIV take 37 cycles. Find the total cycles required to complete the task, speedup as compared multi cycle pipeline?

**Q4.** Explain Scoreboard algorithm for dynamic scheduling of instructions, with the help of various stages? Explain various disadvantages of Scoreboard technique over tomasulo's algorithm?

**[Marks 5]**

**Q5.**

**[Marks 5]**

- a) Explain tournament prediction technique and its advantages?
- b) Explain the importance of Branch Target Buffer (BTB) with example and its advantages over 2 bit predictor?

JUT TEST 2 (MAY 2019)