

國立臺北科技大學 102 學年度碩士班招生考試

系所組別：2210 電腦與通訊研究所甲組

第二節 計算機結構 試題

第一頁 共一頁

注意事項：

1. 本試題共五題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. Hazards are situations in pipelining when the next instruction cannot execute in the following clock cycle. Please explain and answer the following questions.

- (1.) What are structural hazards? (3%)
- (2.) What are control hazards? What is one simple approach for control hazards? If necessary, please draw a diagram to explain the approach. (6%)
- (3.) What are data hazards? What is one simple approach for data hazards? If necessary, please draw a diagram to explain the approach. (6%)

2. Two implementations of a machine are one with and one without special floating-point hardware. Both machines have a clock rate of 1000 MHz. Consider a program with the following mix of operations.

floating-point multiply	10%
floating-point add	20%
floating-point divide	5%
integer instructions	65%

Machine with floating-point called MFP requires the following number of clock cycles for each instruction.

floating-point multiply	7
floating-point add	5
floating-point divide	20
integer instructions	2

Machine without floating-point called MNFP must emulate the floating-point operations using integer instructions. The integer instructions all take 2

clock cycles. Other floating-point operations require the following number of integer instructions.

floating-point multiply	40
floating-point add	20
floating-point divide	50

- (1.) Find the native MIPS ratings for both machines. (10%)
 - (2.) If MFP needs 300 million instructions for this program, what is the execution time (in seconds) for this program run on MFP and MNFP? (20%)
3. Please explain what translation-lookaside buffer is and how it operates in details. Besides, draw a diagram to explain the relationship among virtual pages, translation-lookaside buffer, physical memory, and disk storage. (15%)
4. Please explain and answer the following terms.
- (1.) What is polling and its overhead? (10%)
 - (2.) What is interrupt-driven I/O and its overhead? (10%)
 - (3.) What is direct memory access (DMA)? What are three steps in a DMA transfer? (15%)
5. According to IEEE 754, please show the single precision binary representation of -0.375 (5%)