淡江大學九十三學年度碩士班招生考試試題

系別：電機工程學系　　科目：計算機概論(含計算機組織)

准帶項目請打「○」否則打「×」
簡單型計算機
X

1. (20%) In computer systems, the error checking or correction methods are needed to validate the data and improve the data reliability. Describe the related error checking/ correction method(s) used for each component listed in the followings:
   (a) Random Access Memory (RAM) (4%)
   (b) Read Only Memory (ROM) (4%)
   (c) Redundant Array of Independent Disks (RAID) Level 2 (4%)
   (d) Conventional Network Interface Card (NIC) (4%)
   (e) Compact Disk Read-only Memory (CD-ROM) (4%)

2. (20%) There are different approaches have been developed for computer systems. Under the same situation and condition, answer the following questions with 'True' or 'False'. Justify your answers.
   (a) Networks using client-server model is able to support more subscribers to exchange data than the networks using peer-to-peer model. (4%)
   (b) The processing time of handling interrupt is longer than that of handling context switch. (4%)
   (c) Codes with indirect addressing mode occupy more memory space than the codes with indirect addressing mode. (4%)
   (d) The link utilization of pure circuit switch network is higher than that of pure packet switch network. (4%)
   (e) The sorting problem is more complicated than the selection problem. (4%)

3. (15%) One of the major problems in designing an instruction pipeline is assuring a steady flow of instructions to the initial stages of the pipeline. The primary impediment is the conditional branch instruction. Until the instruction is actually executed, it is impossible to determine whether the branch will be taken or not. Please describe at least **three** different approaches have been taken for dealing with conditional branches.

◀注意背面尚有試題▶

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4. (15%) A file contains only colons, spaces, newlines, commas, and digits in the following frequency : colon (100), space (605), newline (100), comma (705), 0 (431), 1 (242), 2 (176), 3 (59), 4 (185), 5 (250), 6 (174), 7 (199), 8 (205), 9 (217).
   (a) Construct the Huffman code (table). (10%)
   (b) Calculate the compression ratio in the considered file. (5%)

5. (10%) Design a circuit that compares two 4-bit numbers, A and B, to check if they are equal. The circuit has one output x, so that $x = 1$ if $A = B$, and $x = 0$ if $A \neq B$.

6. (10%) Create the state table and draw the state diagram for
   (a) a *JK* flip-flop (3%)
   (b) a *SR* flip-flop (3%)
   (c) a *D* flip-flop (2%)
   (d) a *T* flip-flop (2%)

7. (10%) Draw the diagram of a 4-bit binary ripple counter using flip-flops that trigger on the
   (a) positive-edge transition (5%)
   (b) negative-edge transition (5%)