

國立臺灣科技大學

九十一學年度博士班招生考試試題

系所組別：電子工程系甲組

科目：計算機系統

1. (10%) Suppose that we wish to construct a deterministic acceptor for the set of all binary strings containing, at any position, the string 01011. (a) At first, design a nondeterministic acceptor for the string 01011. (b) Convert it to a deterministic acceptor.
2. (20%) (a) Give the definitions of P and NP.
(b) Give the definition of NP-complete.
(c) What is Cook's theorem? Describe its proof briefly.
(d) How to prove a given problem to be NP-complete?
(e) Why is it "hard" to solve NP-complete problems? Hint: From the definition.
3. (30%) Describe the following interconnection topologies by using examples: (a) linear array, (b) ring, (c) tree, (d) mesh, (e) torus, (f) systolic array, (g) hypercube, (h) bus, (i) crossbar, and (j) multistage interconnection network.
4. (20%) (a) In order to reduce disk I/O access time, there are several I/O bufferings in computer systems. Describe where I/O bufferings are?
(b) Suppose that we want to write a program to measure the average access time per disk block by issuing disk block readings 1000 times and averaging the time interval. In order to get accurate average access time, it is necessary to avoid reading disk blocks from the buffers. Describe how to avoid reading disk blocks from the buffers.
5. (20%) (a) Describe round-robin scheduling and priority scheduling with setting the priority to $1/f$, where f is the fraction of the last quantum that a process used.
(b) Suppose that there are two operating systems employing above two scheduling algorithms to schedule processes. Write test programs to distinguish these two operating systems.

