國立臺灣科技大學
九十四學年度碩士班招生考試試題
系所組別：電子工程系碩士班甲組
科　　目：作業系統

總分 100 分

1. (10%) After executing the program shown below, what is the output on the screen?

```
main()
{
    int status;
    printf("first\n");
    if( fork() != 0) {
        waitpid(-1, &status, 0);
        printf("second\n");
    } else {
        printf("third\n");
    }
    printf("fourth\n");
}
```

2. (10%) One way of implementing a multi-threaded server would be to have a boss thread, which gives out jobs to a number of worker threads. Discuss the tradeoffs involved in having a fixed number of these, as opposed to creating a new one for each job, and terminating it when finished.

3. (10%) The C instruction "item--" compiles to the following code

```
MOV EAX, items
DEC  EAX
MOV items, EAX
```

The second instruction decrements the EAX register. What happens if a process is context switched out after the first instruction, and another process executes "item--" on the same variable?

4. (10%)Consider the following snapshot of a system. P_0, P_1, P_2 and P_3 are processes and A and B are resources.

Available

A	B
3	5

	Max		Allocation		Need	
	A	B	A	B	A	B
P_0	7	5	0	1	7	4
P_1	3	2	2	0	1	2
P_2	9	0	3	0	6	0
P_3	2	2	2	1	0	1

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Answer the following questions using the banker's algorithm:
(a) Is the system in a safe state? (explain it, don't just answer 'yes' or 'no'.)
(b) If a request from processes P_2 arrives for (3, 0), can the request be immediately granted? (explain it, don't just answer 'yes' or 'no'.)

5. (10%) After executing the program shown below, what are the output on the screen and the contents of files "abc" and "def"? Assume that file descriptor 1 is initially for standard output in this process.

```
main()
{
    int fd1, fd2;
    write(1, "test 1\n", 7);
    fd1 = dup(1);
    close(1);
    open("abc", O_WRONLY);
    write(1, "test 2\n", 7);
    fd2 = dup(1);
    write(1, "test 3\n", 7);
    close(1);
    open("def", O_WRONLY);
    write(1, "test 4\n", 7);
    write(fd2, "test 5\n", 7);
    write(fd1, "test 6\n", 7);
    write(1, "test 7\n", 7);
    close(1);
    dup(fd2);
    write(1, "test 8\n", 7);
}
```

6. (10%) The period of the time slice interrupt has a great impact to the OS.
(a) Discuss what will happen if the period of time slice is too long.
(b) Also what will happen if the period of time slice is too short.

7. (12%) When a user process incurs "Page Fault", there are usually two types of page faults. What are these page faults? How does the kernel handle these two kinds of page faults?

8. (12%) Explain the following scheduling schemes in detail.
(a) Round-robin scheduling
(b) Multilevel Queue scheduling

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9. (8%) Why can the TLB increse the performance of virtual memory system?

10. (8%) In protection OS, why can't the "system call" be implemented by normal procedure call?

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