一、選擇題 (40%，每題 4%)

(C) 1. Which of the following would lead you to believe that a given system is an SMP-type system?

A) Each processor is assigned a specific task.

B) There is a boss–worker relationship between the processors.

C) Each processor performs all tasks within the operating system.

D) None of the above

(D) 2. A ____ can be used to prevent a user program from never returning control to the operating system.

A) portal B) program counter C) firewall D) timer

(B) 3. Two important design issues for cache memory are ____.

A) speed and volatility

B) size and replacement policy

C) power consumption and reusability

D) size and access privileges

(D) 4. What statement concerning privileged instructions is considered false?

A) They may cause harm to the system.

B) They can only be executed in kernel mode.

C) They cannot be attempted from user mode.

D) They are used to manage interrupts.

(D) 5. The two separate modes of operating in a system are

A) supervisor mode and system mode

B) kernel mode and privileged mode

C) physical mode and logical mode

D) user mode and kernel mode

(B) 6. If a program terminates abnormally, a dump of memory may be examined by a ____ to determine the cause of the problem.

A) module B) debugger C) shell D) control card

(B) 7. Policy ____.

A) determines how to do something

B) determines what will be done

C) is not likely to change across places

D) is not likely to change over time

(A) 8. A microkernel is a kernel ____.
A) containing many components that are optimized to reduce resident memory size
B) that is compressed before loading in order to reduce its resident memory size
C) that is compiled to produce the smallest size possible when stored to disk
D) that is stripped of all nonessential components

(A) 9. To the SYSGEN program of an operating system, the least useful piece of information is _____.
A) the CPU being used
B) amount of memory available
C) what applications to install
D) operating-system options such as buffer sizes or CPU scheduling algorithms

(B) 10. _____ provide(s) an interface to the services provided by an operating system.
A) Shared memory B) System calls C) Simulators D) Communication

二、問答題 (60%)
11. What is the purpose of interrupts? What are the differences between a trap and an interrupt? (4% 4%)

The purpose of interrupts is to allow the operating system to respond to events that require immediate attention, like I/O operations.

A trap is a type of interrupt that is generated by a user program when it needs to request a service from the operating system

12. Describe three general methods for passing parameters to the operating system. (6%)

Register Passing/ Stack Passing/ Block passing

13. What are the two models of interprocess communication? What are the strengths and weaknesses of the two approaches? (4% 4%)

Shared Memory Model and Message Passing Model

14. Describe the differences among short-term, medium-term, and long-term scheduling. (6%)

Short-term scheduling: This scheduling is also known as CPU scheduling, and it is responsible for selecting the process to run from a list of available processes. The

primary objective of short-term scheduling is to minimize the response time and maximize the throughput of the system. It is a preemptive scheduling technique, which means that a running process can be interrupted by another process with higher priority.

Medium-term scheduling: This scheduling is responsible for swapping processes in and out of memory. The medium-term scheduler is activated when the number of processes in memory exceeds the available physical memory space. The primary objective of medium-term scheduling is to increase the degree of multiprogramming and optimize the memory usage of the system.

Long-term scheduling: This scheduling is responsible for selecting which processes to be loaded into memory when there is free memory space. The primary objective of long-term scheduling is to keep the CPU busy and ensure that there is no idle time. The long-term scheduler selects the process from a queue of waiting processes that are not yet in memory.

16 15.Including the initial parent process, how many processes are created by the program shown in Figure 3.32? (6%)

```
#include <stdio.h>
#include <unistd.h>

int main()
{
    int i;

    for (i = 0; i < 4; i++)
      fork();

    return 0;
}
```

Figure 3.32 How many processes are created?

(B) (C) 16. Which of the following components of program state are shared across threads in a multithreaded process? (8%)

a. Register values

b. Heap memory

c. Global variables

d. Stack memory

17. Consider the following code segment:

```
pid_t pid;

pid = fork();
if (pid == 0) { /* child process */
      fork();
      thread_create( . . .);
}
fork();
```

3 a. How many processes are created? (include main process) (5%)

1 b. How many threads are created? (5%)

(D) 18. Which of the following scheduling algorithms could result in starvation? (8%)

a. First-come, first-served

b. Shortest job first

c. Round robin

d. Priority