جامعة الزقازيق
كلية الهندسة
قسم هندسة الحاسبات والمنظومات
الفرقة الثالثة

امتحان نصف الفصل (ربيع ٢٠١٨)
تاريخ الامتحان: ٢٠١٨/٤/٣
الزمن: ١ ساعة وربع
إجمالي الدرجات: ٢٥ درجة
عدد الأسئلة: ٢٥ سؤال

المادة: منظومات التشغيل - CSE 325: Operating Systems

Choose the Correct Answer (Note: You must choose only one answer)

1) The following are examples of the system resources that the OS manages, except .....

A. I/O devices B. CPU time C. Memory D. None of them

2) Which of the following instructions should not be privileged?

A. Set value of timer. B. Read the clock. C. Clear memory. D. A, and C

3) Parameter values could be passed to the operating system using .....

A. Registers B. Stack C. Indirect addressing D. A, B, and C

4) When power initialized on system, execution starts at the .....

A. Kernel B. OS C. Bootstrap D. Bootcoin

5) Executable files residing on the disk are called

A. Programs B. Processes C. Tasks D. Services

6) ..... selects from among the processes in ready queue, and allocates the CPU to one of them

A. Ready-term scheduler B. Long-term scheduler C. Short-term scheduler D. Medium-term scheduler

7) Which of the following is not part of the PCB?

A. Program counter B. Stack C. Process state D. A, B, and C

8) ..... is a system call that returns the status information and the pid of the terminated process.

A. fork() B. exec() C. return() D. wait()

9) Which of the following code snippets creates a zombie process?

A.
```
main(){
  pid_t pid;
  pid = fork();
  if (pid > 0){
    wait(NULL);
  }
}
```

B.
```
main(){
  pid_t pid;
  pid = fork();
  if (pid == 0){
    wait(NULL);
  }
}
```

C.
```
main(){
  pid_t pid;
  pid = fork();
  if (pid != 0){
    wait(NULL);
  }
}
```

D.
```
main(){
  pid_t pid;
  pid = fork();
  if (pid >= 0){
    wait(NULL);
  }
}
```

10) Consider the following code:

```
int main()
{
  pid_t pid;
  pid = fork();
  fork();
  if (pid == 0) {
    fork();
    fork();
  }
}
```

Without including the first parent, how many processes are created?

A. 4 B. 7 C. 9 D. 15

11) Which of the following components of program state are shared across threads in a multithreaded process?

A. Register values B. Stack memory C. Global variables D. A, B, and C

12) A university campus with limited funds is upgrading its main server facility. The main program (student affairs) that the server runs has an 80% parallel component. You have been assigned the task of choosing the specification of the new server such that the student affairs' program is sped up by at least a factor of 4. How many processors would you choose for the server? You have to consider the budget.

A. 4 B. 8 C. 16 D. 32

13) Your role is to optimize the speed of an existing application to benefit from a system that have eight processing cores. The system is managed by an OS that applies the many-to-one threading model. How many threads would you divide the application into?

A. 8 B. 4 C. 2 D. 1

14) Which of the following configurations employs concurrency but not parallelism?

A. Single-programming in a multi-processor system
B. Multi-programming in a multi-processor system
C. Multi-programming in a single processor system
D. Multi-threading in a multi-processor system

15) Consider the following code:

```
int value = 5;
void *runner(void *param);
int main(int argc, char *argv[]) {
    pid_t pid;
    pthread_t tid;
    pthread attr_t attr;
    pid = fork();
    pthread attr init(&attr);
    pthread create(&tid,&attr,runner,NULL);
    pthread join(tid,NULL);

    if (pid == 0) {
        printf("%d", value); /* LINE 1 */
    }
    else if (pid > 0) {
        printf("%d", value); /* LINE 2 */
    }
}
void *runner(void *param) {
    value = 10;
    pthread exit(0);
}
```

What is the output at Line 1 and Line 2?

A. 5, 10 B. 10, 5 C. 5, 5 D. 10, 10

16) The following code represents code snippets for a producer and a consumer that share a common variable, counter.

```
while (true) {
      /* produce an item*/
       while (counter == BUFFER_SIZE);
       buffer[in] = next_produced;
       in = (in + 1) % BUFFER_SIZE;
       counter++;
}
```

```
while (true) {
       while (counter == 0);
       next_consumed = buffer[out];
       out = (out + 1) % BUFFER_SIZE;
       counter--;
       /* consume the item*/
}
```

Consider that the BUFFER_SIZE equals 10 and the counter has a value of 10. This means that the buffer is

A. Full B. May be full C. Empty D. May be empty

17) ..... can be defined as If no process is executing in its critical section and there exist some processes that wish to enter their critical section, then the selection of the processes that will enter the critical section next cannot be postponed indefinitely.

A. Bounded waiting B. Mutual exclusion C. Progress D. Selection problem

18) Which of the following is considered an implementation of the test and set instruction?

A.
```
boolean test_and_set
(boolean target){
  boolean rv =
*target;
  *target = TRUE;
  return rv;
}
```

B.
```
boolean test_and_set
(boolean *target){
  *target = TRUE;
  boolean rv =
*target;
  return rv;
}
```

C.
```
boolean test_and_set
(boolean *target){
  boolean rv =
*target;
  target = TRUE;
  return rv;
}
```

D.
```
boolean test_and_set
(boolean *target){
  boolean rv =
*target;
  *target = TRUE;
  return rv;
}
```

19) For the following code:

```
do {
  wait[i] = false;
  while (!wait[j]) {
    if (turn == j) {
       wait[i] = true;
       while (turn == j);
       wait[i] = false;
    }
  }
  /* critical section */
  turn = j;
  wait[i] = true;
  /* remainder section */
} while (true);
```

Consider that we have two processes P1 and P2, which share the `wait` and `turn` variables. Which requirement of the critical section problem is satisfied by this code?

A. Mutual Exclusion and Progress B. Progress and Bounded Waiting C. Bounded Waiting and Mutual Exclusion D. All of them

20) Using spinlocks to solve the critical section problem can lead to ....

A. Poor CPU utilization B. Criticallocks C. A, and B D. None of them

21) CPU scheduling decisions for non-preemptive scheduling may take place when a process

A. Switches from new to ready state B. Switches from running to ready state C. Terminates D. A&C

22) Waiting time is the amount of time a process has been waiting in the

A. Waiting queue B. Ready queue C. Job queue D. Process Queue

23) Suppose that the following processes arrive for execution at time 0.0 in the order P1, P2, P3.

Process	Burst Time	Priority (highest is lower)
P1	7	1
P2	4	0
P3	5	2

Which scheduling algorithm gives the min. avg. turnaround time?

A. FCFS B. RR (quantum = 1) C. SJF D. Priority

24) Suppose that the following processes arrive for execution at time 0.0 in the order P1, P2, P3.

Process	Burst Time
P1	6
P2	8
P3	2

Assume that the system employs a non-preemptive priority scheduling, and you are asked by the system administrator to assign priorities to such processes, so that the average waiting time is minimized. Which priorities would you choose for P1, P2, P3 respectively? Assume that higher numbers give lower priorities.

A. 2, 1, 5 B. 1, 2, 0 C. 1, 2, 3 D. 4, 2, 0

25) Consider two processes, P1 and P2, in a real-time system, where p1 (period) = 10, t1 (processing time) = 5, p2 = 15. What value for t2 allows these two processes to be scheduled using rate-monotonic scheduling? Assume that the deadline for each process equals its period.

A. 10 B. 8 C. 6 D. 4