《 SE-223 操 作 系 统 》 期 末 试 题 试 卷 （ B）

(考 试 形 式 ： 闭 卷 考 试 时 间 ：2 小 时)

警 示 《中山大学授予学士学位工作细则》第六条

考 试 作 弊 不 授 予 学 士 学 位

方向：＿＿＿＿＿＿＿＿ 姓名：＿＿＿＿＿ 学号：＿＿＿＿＿＿

出卷：＿常会友、刘宁、凌应标＿＿＿＿ 复核：＿＿＿＿＿＿＿＿

一、 **Explain following terms (15pts)**

1.Interrupt,

2. Process,

3.Virtual Memory,

4.MMU(Memory Management Unit),

5.Thrashing

二、 **Short Answer** （25pts）

(1) What is virtual memory? What is the maximum capacity of the virtual memory?

(2) What is address space and storage space?

(3) What is file directory and directory file?

(4) What is the difference between job scheduling and process scheduling?

(5) What is the difference between process and thread?

三、 **(10 pts)** Consider five job A, B, C, D, E, they almost reach at the same time. Their expected running time is 10min, 6min, 2min, 4min, 8min, respectively. And their corresponding priorities are 3, 5, 2, 1, 4(5 is the highest priority). For each of the following scheduling algorithm, to calculate the turnaround time of each process(Never mind process switching)

(1) FCFS with a queue A, B, C, D, E.**(5 pts)**

(2) RR. Time splice is 2min.**(5 pts)**

四、**(13 pts)**With the banker's algorithm, consider the following snapshot of a system:

resources / processes	Allocation A B C D	Need A B C D	Available A B C D
P0	0 0 3 2	0 0 1 2	
P1	1 0 0 0	1 7 5 0	
P2	1 3 5 4	2 3 5 6	1 6 2 2
P3	0 3 3 2	0 6 5 2	
P4	0 0 1 4	0 6 5 6	

1. Is the system in a safe state?**(6 pts)**

2. If a request from process P2 arrives for(1, 2, 2, 2), can the request be granted immediately?**(7 pts)**

五、**(10 pts)**A system has a demand-page storage management schemes. 1MB main memory is divided into 256 blocks. Each block is 4KB. Consider a job with a following page table:

Page number	Block number	State
0	24	0
1	26	0
2	32	0
3	—	1
4	—	1

(State 0 means that the corresponding page is in the memory. State 1 means that not.)

1. Given a logical address, 9016(in decimal), to translate into a physical address.**(5 pts)**

2. Given a logical address, 12300(in decimal), to translate into a physical address.**(5 pts)**

六、**(12 pts)**In a demand-page storage management system, consider a reference string: 4, 3, 2, 1, 4, 3, 5, 4, 3, 2, 1, 5.

(1) Calculate page fault queue and page fault ratio using FIFO with 4 frames.**(6 pts)**

(2) Calculate page fault queue and page fault ratio using LRU with 4 frames.**(6 pts)**

七、**Please select and answer ONE of the following two questions**

1. **(15 pts)**Consider a file system using direct index and indirect index. There are 10 pointers of disk blocks in a file's inode. The first 8 of these pointers are the direct block pointers, and the next 2 pointers point to the indirect blocks (a single indirect block and a double indirect block). Each pointer is 4 bytes size. Each block is 2KB size.

(1) How many bytes does the largest file in this file system occupy under this method (excluding the block of the inode of the file)?**(5 pts)**

(2) Give a file with 128MB size, calculate how many bytes does this file occupy actually (excluding the block of the inode of the file)?**(10 pts)**

2. (**15 pts**) Consider some processes share a data area. Some processes (reader) of them just read this data area, and the others of processes update this data area. A solution for synchronizing tthese processes is shown as below.

```
/* program reader_and_writer */        void writer() {
int readcount;                             while(true)     {
semaphore    x=1,wsem=1;                      P(wsem);
void reader() {                                WRITEUNIT();
   while(true)      {                         V(wsem);
       P(x);                                }
        readcount++;                     }
      if (readcount==1)                  void main() {
           P(wsem);                         readcount=0;
       v(x);                              parbegin(reader(), writer());
       READUNIT();                       }
     P(x);
     readcount--;
     if (readcount==0)
          V(wsem);
      V(x);
     }
}
```

(1) Demostrate this solution is preferring the readers to the writers by a timeline of some concurrent processes. **(5 pts)**

(2) Modify this solution to prefer the writers to the readers. **(10 pts)**