北京邮电大学 2021——2022 学年第一学期

《操作系统》期中考试试题。

果程 题号	操作	系统	tion and	考试		202	1年11	月 12	В	
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A. FCFS	hen it becomes equivalent to B. SJF
C. priority scheduling	D. multilevel queue scheduling
5. In the following,	is not one of the conditions which should be
satisfied for a good soluti	on to critical section problem.
A. mutual exclusion	B. progress
C. bounded waiting	D. fairness
recipient receives the me	queue, the sender must always block until the ssage.
A. zero capacity	B. variable capacity
C. bounded capacity	D. unbounded capacity
7 requires th	nat the operating system be given in advance
additional information co	ncerning which resources a process will request
and use during its lifetim	e. With this additional knowledge, it can decide
for each request whether	or not the process should wait.
A. Deadlock avoidance . Deadlock detection	B. Deadlock prevention
Deadlock detection	D. Recovery from Deadlock
process-scheduling ?	owing migrations is impossible for
A. running->ready	B. running->waiting
C. waiting→running D	. running-terminate
9. The definition of	s the number of processes that are completed per
time unit.	s the number of processes that are completed per
A. CPU utilization	B. response time
C. turnaround time	D. throughput
	- moogaput
10. Both Linux and Solar	ris 10 use the method for the correspondence
between user threads:	and kernel threads.
A. One-to-One	B. Many-to-One
C. One-to-Many	D. Many-to-Many
	- Many
二、Essay question	(20 points)
1 (5 points) Please	explain the principles of the multiple feedback que

scheduling algorithm.

- 2. (5 points) Some atomic machine instructions support mutual exclusion effectively. Define a procedure to make exclusion with instruction compare and swap for two boolean variables.
- 3. (5 points) Describe the priority inversion problem in the realtime system with an example.
- 4. (5 points) Explain the implementation of conditional variables with "signal and continue" (Per Brinch Hansen).

三、(20 points) Here is a table of processes and their associated arrival and running times.

process	Arrival time	CPU burst time				
P1	0	2				
P2	1	6				
P3	3	5				
P4	5	4				
P5	6	3				

Show the scheduling order for these processes under 3 policies: First Come First Serve (FCFS), Shortest-Remaining-Time-First (SRTF), Round-Robin (RR) with timeslice quantum = 2, by filling in the Gantt chart with ID of the process currently running in each time quantum.

Assume that context switch overhead is 0 and that new RR processes are added to the head of the queue and new FCFS processes are added to the tail of the

- 1) Draw a Gantt chart illustrating the execution of these processes with different scheduling algorithms.
- ie and the average turnaround time f 2) Calculate the average wai different scheduling algorithms.
- 四. (30 points) Bridge Crossing Problem. An old bridge which crosses a river from east to west. Since it is a narrow bridge, cars can only go in one direction at a time and no more than 4 cars are allowed on the bridge.
- · Cars arriving at the bridge while the bridge is empty will immediately cross the bridge.
- · Cars arriving at the bridge while there are cars on the bridge traveling in the

different direction will wait until the bridge becomes empty.

- · Cars arriving at the bridge while there are less than 4 cars already on the bridge in the same direction will immediately cross the bridge.
- (1) Write a program to coordinate the westward and eastward cars to pass through the bridge.
- (2) Explain whether deadlock or starvation can occur in your design of the synchronization for the problem.

五. (20 points) (1) Consider the following snapshot of a system, answer the following questions according to the Banker's algorithm.

	Allocation				Max				Available				
			C	D	A	В	С	D	A	В	C	D	
PO	A 0	B 0	2	2	0	0	4	2	1	1	2	0	
P1	2	0	0	0	2	5	5	0					
P2	1	0	3	3	5	6	5	5					
P3	2	3	4	3	4	3	4	5					
P4	0	4	3	2	0	5	4	2					

Calculate matrix NEED. Is the system in safe state? Why?

(2) If a request from process P2 arrives for resources (1, 0, 0, 0), can the requested be granted immediately? If yes, then show the sequence of successful process executions in tabular form; if no, then you do not need to show any further details.