DeerWalk Institute of Technology

Tribhuvan University

B. Sc. CSIT 3rd Semester

Operating System CSc 203

2014

Name :- **Roll No :-**

Notes to students

- **This test lasts for 90 minutes and consists of 150 marks, and for pass your exam you have to score at least 60 marks. Budget your time accordingly.**
- **This test has 10 questions and 12 pages. Check that you have all pages before starting.**
- **Write in pen, no pencils.**
- **Write your answer on this "question and answer" paper, in the spaces provided. Be concise. In general, the amount of space provided is an upper bound on the "size" of answer that is expected. If necessary, use space where available and provide explicit pointers.**

Question 1 (15 marks)	**Question 2 (5 marks)**	**Question 3 (35 marks)**	**Question 4 (20 marks)**
Question 5 (25 marks)	**Question 6 (15 marks)**	**Question 7 (20 marks)**	**Question 8 (5 marks)**
Question 9 (5 marks)	**Question 10 (5 marks)**		
TOTAL (OBTAINED MARKS)			

1. Tick the correct questions. (15 points, 1 point each, except no i (3 points))
    a. Which statement about resource is FALSE?
        i. A process must request a resource before using it.
        ii. The operating system can provide resources.
        iii. A process must be blocked before requesting a resource.
        iv. A process block its operation until a requested resource is allocated.
    b. Non preemptive scheduling strategies include the following EXCEPT
        i. FCFS
        ii. Shortest Job Next
        iii. Priority
        iv. Worst Fit
    c. Which of the following is NOT a transition between process states?
        i. Ready to blocked
        ii. Ready to running
        iii. Running to blocked
        iv. Running to ready
    d. In the reader writer problem processes p and q are allowed to simultaneously access the shared resource if and only if
        i. p and q both are reading
        ii. p and q both are writing
        iii. p is reading and q is writing or vice versa
        iv. None of the above
    e. Round Robin scheduling is essentially the preemptive version of
        i. FIFO
        ii. SJF
        iii. Shortest Time Remaining First

f. Switching the CPU to another Process requires to save state of the old process and loading new process state is called as
    i. Process Blocking
    ii. Context Switch
    iii. Time Sharing
    iv. None of the above
g. Concurrency on a uniprocessor is achieved by
    i. Critical section
    ii. Message passing
    iii. Time sharing
    iv. None of the above
h. Three ways in which execution can switch from user space to kernel space are
    i. System calls
    ii. Exceptions
    iii. Interrupts
    iv. Thread
i. Processes (or threads) can be in one of three states: Running, Ready, or Blocked. List the state of the process (or thread) for each of the following four cases?
    i. Waiting for data to be read from a disk. _____
    ii. Spin-waiting for a lock to be released. _____
    iii. Having just called wait() on a condition variable in a monitor._____
    iv. Having just completed an I/O and waiting to get scheduled again on the CPU. _____

j. The ability of a computer system to switch execution among several jobs that are in memory at the same time is called

i. Time slicing
ii. Multiprogramming
iii. Multiprocessing
iv. Multitasking
v. None of the above

k. In a batch system the time defined as the time from which a job is submitted until the job is returned to the user is called the

i. Run time

ii. Burst time

iii. Idle time

iv. Turnaround time

l. Which of the following is NOT referred to as an operating system?

i. MS DOS

ii. Linux

iii. Windows SDK

iv. Windows XP

v. Unix

m. In a system where round robin is used for CPU scheduling, the following is true when a process cannot finish its computation during its current time quantum.

i. The process will terminate itself.

ii. The process will be terminated by the operating system.

iii. The process's state will be changed from running to ready.

iv. None of the above.

2. Suppose three peoples are in a line waiting for a department store to open for "**the big sale**". When the door opens, all three rush the door, but the door is not big enough for all them to pass through at once. Describe a solution for addressing this deadlock that will allow three peoples to pass through the door. Which of the 4 necessary deadlock conditions does your solution break? [5]

3. Consider the following set of process, with the length of CPU burst time given in milliseconds.

Processes	Arrival time	CPU Burst time	Priority
1	0	9	3
2	0	4	1
3	0	5	3
4	5	8	4
5	10	4	2

a. Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF, Priority (a smaller priority number implies a higher priority), RR(Quantum = 5 units). (10 points)

b. What is the turnaround time for each process for each of the scheduling algorithm in part (4.a)? (10 points)

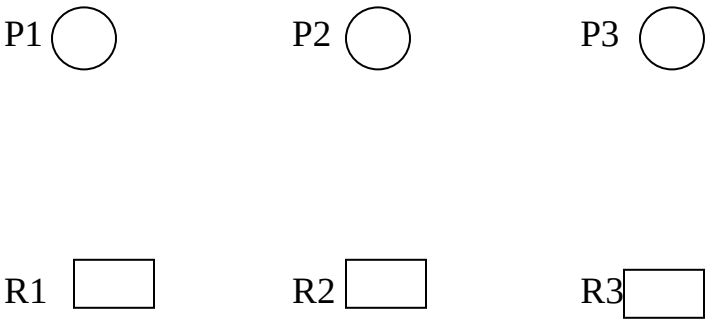
c. What is the waiting time of each process for each of the scheduling algorithm in part (4.a)? (10 points)

d. Which of the schedule results minimal average waiting time? [5]

4. Given the following scenario involving three processes P1, P2 and P3 and three resources R1, R2 and R3.

Time	Action
1	P1 request the printer R1
2	R1 is allocated to P1
3	P1 requests the tape drive R2
4	R2 is allocated to P1
5	P2 requests R2
6	P2 requests R3
7	P3 requests the tape drive R2

a. Draw a directed graph of the above requests and allocations. (10 points)



b. Is the system is in deadlock Yes / No_____ (2 points)

c. What are the four conditions necessary to have a deadlock? (8 points)

i.
ii.
iii.
iv.

5. Consider the following snapshot of a system.

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

Answer the following questions using the banker's algorithm.

a. What is the content of matrix *Need*? (10 points)

b. Is the system in a safe state? If yes give the sequence. (5 points)

c. If a request from process from P1 arrives for (0, 4, 2, 0), can the request be granted immediately? (10 points)

6. Joe Smart says “If you want to schedule processes to minimize the TOTAL wait time of all processes, it is quite easy. Just use the shortest Job First rule.” *First explain what Joe means. Then prove or argue why Joe is right. Finally discuss the issues raised by this Smart ides and how we cam resolve them*. (15 points).

7. For the following statements, specify whether they are TRUE or FALSE. (20 points, 2 points each)
    a. Race condition cannot occur in uniprocessor. _____
    b. Multiprogramming is not possible in uniprocessor system. _____
    c. SJF can be implemented as a priority algorithm, where the priority is determined by the arrival time of the job. _____
    d. A process in the Ready state can only transition to running state. ____
    e. Interrupt is better than polling. _____
    f. The value of a semaphore represents how many processes are waiting for a common resource. _____
    g. User has control over all the resources of computer. _____
    h. System call is transfer of control from slave mode to master mode. _____
    i. Interrupts are used to achieve a typical timesharing._____
    j. Race conditions cannot be avoided. _____
8. Interrupt disabling can be used to achieve mutual exclusion. But it has some defects. List them. (5 points)

9. What is the meaning of the term busy waiting? Can busy waiting be avoided? (5 points)

10. The following algorithm is proposed to solve the critical section problem between two processes P_1 and P_2, where lock is a shared variable. (5 points)

P_1	P_2
do { *while (lock) { NULL; }* *lock = TRUE;* *critical section;* *lock=FALSE;* *reminder section;* *} while(TRUE);*	*do {* *while (lock) { NULL; }* *lock = TRUE;* *critical section;* *lock=FALSE;* *reminder section;* *} while(TRUE);*

Which of the following statements is true regarding the proposed algorithm?

i. Mutual exclusion to the critical section is guaranteed.

ii. Both processes can be in their critical section at the same time.

iii. Lock should be initialized to TRUE.

iv. None of the above.