

25/4/19

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B.E / B.Tech (FT) END SEMESTER EXAMINATIONS – APRIL / MAY 2019

CSE/IT/EEE
Semester IV
CS7452-OPERATING SYSTEMS
(Regulation 2015)

Time: 3 Hours

Answer ALL Questions

Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. What does an interrupt do?
2. How would you differentiate between a process and a thread?
3. Is it possible to have a deadlock involving only one process? Justify your answer.
4. Define critical region.
5. Distinguish between main memory and secondary storage in terms of the operations of the operating systems.
6. What is page fault?
7. What is seek time in disk scheduling?
8. What are the operations performed on a file?
9. What is a daemon? How does it work in Linux operating system?
10. What is the role of kernel?

Part – B (5 x 13 = 65 mark)

11. a) i) What are the various computing environments available in the modern computers? (4)
ii) Explain how operating systems are used in these different computing environments. (9)
OR
b) i) Briefly describe the purpose and need of interprocess communication in a multiprogramming environment. (7)
ii) "Operating systems typically utilize the kernel mode and user mode functions as rudimentary forms of protection." Explain the two modes and justify this statement. (6)
12. a) i) Draw a resource-allocation-graph for the scenario given below: (6)
Set of resources: {R1, R2, R3, R4, R5}
Set of processes: {P1, P2, P3, P4, P5}
R1 is allotted to P2 and requested by P1; R2 is allotted to P1 and requested by P4;
R3 is allotted to P5 and requested by P2; R4 is allotted to P3 and requested by P2;
Provide the corresponding wait-for-graph and comment on the presence of deadlock.
ii) Consider the following snapshot of a system: (7)



	Maximum				Allocation				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P1	3	3	2	2	1	2	2	1	3	1	1	2
P2	1	2	3	4	1	0	3	3				
P3	1	1	5	0	1	1	1	0				

Answer the following questions using the Banker's algorithm:

- Provide the content of the matrix Need.
- Is the system in a safe state? Provide all the necessary calculations to support your answer.
- If the maximum request of process P1 changes to (3, 4, 3, 2), will the state of the system change? Provide all the necessary calculations to support your answer.

OR

- b) A barbershop consists of a waiting room with a chair for the barber and n chairs for waiting customers. If there are no customers to be served, the barber goes to sleep in his chair. If a customer enters the barbershop, he wakes up the barber, if sleeping. If there are many customers and the barber is busy, then a customer has to either wait, if there is a free chair or, if all chairs are occupied, the customer leaves the shop. If the barber is busy but chairs are available, then the customer sits in one of the free chairs.
- What problem does this scenario address? (2)
 - Draw a flowchart for this scenario. (4)
 - Write a program using semaphore to coordinate the barber and the customer. (7)
13. a) i) Consider a paging system with the page table stored in memory. If a memory reference takes 200 nanoseconds, how long does a paged memory reference take? If we add TLBs, and 75 percent of all page table references are found in the TLBs, what is the effective memory reference time? (Make and state any necessary assumptions required) (7)
- ii) Describe the following allocation algorithms: (6)
- First fit
 - Best fit
 - Worst fit

OR

- b) i) Consider the following page-reference string: (9)
- 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6.
- How many page faults would occur for the FIFO, OPT and LRU page replacement algorithms assuming five frames? Which algorithm performs better for the given page-reference string? Justify your answer.
- ii. Explain segmentation in detail. (4)
14. a) Suppose a disk drive has 10000 cylinders, numbered 0 to 9999. The drive is currently serving a request at cylinder 1142. The previous request was at cylinder 1125. The queue of pending requests in FIFO order is 185, 4169, 3912, 2773, 4947, 5508, 8021, 4749, 9129. Calculate the total distance that the disk arm moves to satisfy all the pending requests, for each of the following disk scheduling algorithms. (13)
- FCFS
 - SSTF
 - SCAN
 - C - SCAN



OR

- b) i) Explain various file allocation techniques in detail with their relative advantages and disadvantages (6)
ii. Explain different directory implementation methods. (7)
15. a) i) Explain the process management mechanisms in Linux system. (6)
ii) What kind of scheduling takes place in Linux environment? Discuss in details. (7)

OR

- b) i) Describe the architecture of the Windows 7 operating system. (6)
ii) What are the various services provided by the Windows operating system? Describe in details. (7)

Part – C (1 x 5 = 15 mark)

16. i) Suppose a new process arrives in a system at an average of six processes per minute and each such process requires an average of 8 seconds of service time. Calculate the fraction of time the CPU will be busy in a system with a single processor. (4)
ii) Consider the following table showing a set of processes with arrival time (in milliseconds), CPU burst time (in milliseconds) and priority (consider 0 as the highest priority). Assume that none of the processes have I/O burst time. (4)

Process	Arrival time	Burst Time	Priority
P1	0	11	2
P2	2	10	1
P3	5	28	0
P4	9	16	4
P5	12	2	3

Calculate the average waiting time (in milliseconds) of all the processes using preemptive priority scheduling algorithm.

- iii) Under what circumstances do page fault occur in a demand paging environment? Describe the actions taken by the operating system on the occurrence of a page fault. (7)

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