

Question Paper - Report

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Question Paper



MANIPAL ACADEMY OF HIGHER EDUCATION

B.Tech Vth Semester Sessional Examination October 2022

OPERATING SYSTEMS [CSE 3153]

Marks: 15

Duration: 60 mins.

MCQ

Answer all the questions.

Section Duration: 20 mins

- 1) When translating a virtual address to a physical address, a multilevel page table is always a preference as compared to a single level page because it

Helps in the reduction of the total page faults in the page replacement algorithms

Reduces the total memory access time for reading or writing a memory location

Helps in the reduction of the page table size required for implementing a process's virtual address space

Is required by the lookaside buffer translation

(0.5)

- 2) Consider paging hardware that has a TLB. Let us assume that the page table and the pages are in their physical memory. Searching the TLB takes 10 milliseconds, and accessing the physical memory takes 80 milliseconds. In case the TLB hit ratio is 0.6, then the effective memory access time is _____ (in milliseconds).

124122120118.

- 3) A total of 9 units of a resource type available and safe state, which of the following sequence will be a safe state ?

Process	Used	Max
P1	2	7
P2	1	6
P3	2	5
P4	1	4

P1, P3, P4, P2P4, P2, P1, P3P4, P2, P3, P1P3, P1, P2, P4.

- 4) On a system having a single processor using demand paged memory, it takes 200ns to satisfy a memory request if the page is in the memory. The system takes 7ms to check a free frame while 15ms if the page to be swapped out has been modified. What is the effective access time if the page fault rate is 5% with 60% of the time the page to be replaced has been modified? Assume the CPU is idle during page swaps and determine the answer in microseconds.

590.19 μs400.67 μs500.29 μs234.76 μs

- 5) What does Belady's anomaly refer to?

Page faults increases as frames decreases in FIFO

Page faults decreases as frames increases in Optimal

Page faults increases as frames increases in FCFS

Page faults increases as frames increases in FIFO

(0.5)

- 6) A process refers to 5 pages, A, B, C, D, E in the order : A, B, C, D, A, B, E, A, B, C, D, E. If the page replacement algorithm is FIFO, the number of page transfers with an empty internal store of 3 frames is?

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- 7) A memory page containing a heavily used page that was initialized very early and is in constant use is removed, then the page replacement algorithm used is

LRUFIFOSJFOptimal

- 8) Which of the following is not true with respect to deadlock prevention and deadlock avoidance scheme?

In deadlock prevention, the request for resource is always granted if resulting state is safe

In deadlock avoidance, the request for resource is always granted if resulting state is safe

Deadlock avoidance requires knowledge of resource requirements a priori

Deadlock prevention is more restrictive than deadlock avoidance

(0.5)

- 9) Solution to critical section problem using Peterson's solution is synchronization between

3 processes2 processesAny number of processesOnly between 2 independent processes

- 10) A counting semaphore was initialized to 10. Then 6 P (wait) operations and 4 V (signal) operations were completed on this semaphore. The resulting value of the semaphore is_____

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DESCRIPTIVE

Answer all the questions.

- 11) Consider a process with page reference string 2,3,2,1,5,2,4,5,3,2,5,2 . with 3 frames in the physical memory initial being empty. Show the optimal and LRU page replacement algorithm. For each, also determine the number of page faults after the first 3 pages are filled in the frames

- 12) Consider the following processes and resources.

Allocation Max Available
.A B CA B C..... A B C
Po..1 1 24 3 3..... 2 1 0
P1 ..2 1 2..... 3 2 2
P2 ..4 0 1..... 9 0 2
P3 .0 2 0..... 7 5 3
P4. 1 1 2.....11 2 3

- a. Determine the total number of each resource type
b. What is the need matrix?
c. Check whether the system is safe or not by using Safety algorithm

- 13) Give an example of deadlock and starvation among 3 processes while accessing 3 semaphores R, S and T whose values being set to 1. Write code snippet for bounded waiting mutual exclusion with test_and_set() .

- 14) Consider a program consists of five segments: S0 = 600, S1 = 14 KB, S2= 100 KB, S3 =580 KB, and S4 = 96 KB. Assume at that time, the available free space partitions of memory are 1200–1805, 50 – 150, 220-234, and 2500-3180.

Find the following:

1. Draw logical to physical maps and segment table?
2. Allocate space for each segment in memory?
3. Calculate the external fragmentation and the internal fragmentation?
4. What are the addresses in physical memory for the logical addresses 0.580 and 1.17? .