s (b) Collection of Keys

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Faculty of Engineering

End Sem Examination May-2023

CS3CO36 / CS3CO09 Operating Systems

Programme: B.Tech.   Branch/Specialisation: CSE /All

Duration: 3 Hrs.   **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Q.1 i.   To avoid the race condition, the number of processes that may be   1
          simultaneously inside their critical section is-
          (a) 0   (b) 1   (c) 2   (d) Any number of processes

     ii. In the non-blocking send _____.   1
          (a) The sending process keeps sending until the message is received
          (b) The sending process sends the message and resumes operation
          (c) The sending process keeps sending until it receives a message
          (d) None of these

     iii. An edge from process Pi to Pj in a wait for graph indicates that?   1
          (a) Pi is waiting for Pj to release a resource that Pi needs
          (b) Pj is waiting for Pi to release a resource that Pj needs
          (c) Pi is waiting for Pj to leave the system
          (d) Pj is waiting for Pi to leave the system

     iv. What is dispatch latency?   1
          (a) The time taken by the dispatcher to stop one process & start
              another
          (b) The time taken by the processor to write a file into disk
          (c) The whole time taken by all processor
          (d) None of these

     v.   If the size of logical address space is 2 to the power of m, and a page 1
          size is 2 to the power of n addressing units, then the high order _____
          bits of a logical address designate the page number, and the _____
          low order bits designate the page offset.
          (a) m, n   (b) n, m
          (c) m – n, m   (d) m – n, n

vi. Physical memory is broken into fixed-sized blocks called?   1
    (a) Frames   (b) Pages
    (c) Backing store   (d) None of these

vii. A process is thrashing if _____ .   1
    (a) It spends a lot of time executing, rather than paging
    (b) It spends a lot of time paging than executing
    (c) It has no memory allocated to it
    (d) None of these

viii. Applying the LRU page replacement to the following reference   1
     string.
     1 2 4 5 2 1 2 4
     The main memory can accommodate 3 pages and it already has pages
     1 and 2. Page 1 came in before page 2.
     How many page faults will occur?
     (a) 2   (b) 3   (c) 4   (d) 5

ix. The heads of the magnetic disk are attached to a _____ that moves   1
     all the heads as a unit.
     (a) Spindle   (b) Disk arm   (c) Track   (d) None of these

x. To create a file _____ .   1
    (a) Allocate the space in file system
    (b) Make an entry for new file in directory
    (c) Allocate the space in file system & make an entry for new file in
       directory
    (d) None of these

Q.2 i. Write the difference between process and thread.   2
   ii. Explain any three types of operating system.   3
   iii. Describe Inter-process communication along with its two models.   5
OR iv. Write short note on: 5
     (a) Critical section   (b) Operations on processes

Q.3 i. What is deadlock? Explain different conditions of deadlock.   4
   ii. Consider a system with three processes and three resource types and   6
   at time to the following snapshot of the system has been taken:

Process	Allocated			Maximum			Available		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
P1	2	2	3	3	6	8	7	7	10
P2	2	0	3	4	3	3			
P3	1	2	4	3	4	4			

    (a) Is the current allocation a safe state? Deduce safe sequence using
       Banker's Algorithm.
    (b) Would the request (1,0,0) be granted for process P2?

OR iii. Assume you have the following jobs to execute with one processor,   6
     with the jobs arriving in the order listed here:

Process	Arrival time	Burst Time(ms)
P1	0	80
P2	10	20
P3	10	10
P4	80	20
P5	85	50

     Suppose a system uses RR scheduling with a quantum of 15 (ms).
     (a) Create a Gantt chart illustrating the execution of these processes.
     (b) What is the turnaround time for process P3?
     (c) What is the average waiting time for the processes?

Q. 4 i. Define external and internal fragmentation with neat and clean   3
     diagram.
   ii. Explain Paging and Solve Logical address space =128KB, Physical   7
     address space =512KB, and page size =16KB,
     Calculate:
     (a) Number of Bits for Logical Address (LA)
     (b) Number of Bits for Physical Address (PA)
     (c) Number of Pages in LAS or process
     (d) Number of Frames in main memory or PAS
     (e) Page Table size
OR iii. Given six memory partitions of 300 KB, 600 KB, 350 KB, 200 KB,   7
     750 KB, and 125 KB (in order), how would the first-fit, best-fit, and
     worst-fit algorithms place processes of size 115 KB, 500 KB, 358
     KB, 200 KB, and 375 KB (in order) in fixed size partitioning?

Q.5 i. Define Thrashing with diagram.   2
   ii. Explain the role of operating system in Security   3
   iii. Given page reference string: 5
     1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6
     Compare the number of page faults for LRU, FIFO and Optimal page
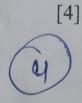   replacement algorithm.

                              P.T.O.

[4]

OR iv. Write short note on:
 (a) Demand Paging   4
 (b) Virtual memory

Q.6 i. Describe at least two file operations.   4
 ii. Discuss in detail any two free space management schemes.

OR iii. Explain following disk scheduling algorithms: 6
 (a) SSTF   (b) SCAN   (c) C-SCAN

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