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B.Tech. V-Sem (Main&Back) Examination, January/February - 2024

Artificial Intelligence and Data Science

5AID4-03 Operating System

CS, IT, AID, CAI, CDS, CIT,CCS

Time : 3 Hours Maximum Marks : 70

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

PART A

(Answer should be given up to 25 words only).

All questions are compulsory. (10×2=20)

1. Define logical and physical Address.
2. Explain the features of operating system.
3. Define the term virtual Memory.
4. Explain the term file system in brief.
5. What is semaphore?
6. Draw the process state diagram.
7. Why page size is always power of 2?
8. What is starvation? How can me overcome it?
9. What is thrashing?
10. Differentiate between pager and swapper.

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions. **(5×4=20)**

1. What is memory management unit (MMU)? Explain Best fit, worst fit and Quick fit algorithms in detail.
2. What are the necessary conditions of deadlock? Explain resource graph model and safe-unsafe states with a suitable example.
3. Explain in detail the following CPU scheduling Algorithm:
   i) Priority Scheduling
   ii) Round Robin.
4. What is the importance of paging and segmentation in memory management? Explain with diagram?
5. Differentiate between Windows and Linux based operating system?
6. Consider 3 pages frames and following refence string use FIFO page replacement algo to calculate the number of page faults in each reference string is -

   7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1
7. Write and explain the Banker's Algorithm for deadlock avoidance?

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Three questions. **(3×10=30)**

1. What is Dining philosophers problem? Explain the solution of this problem by using a suitable example.
2. Consider the following page reference string 1,2,3,4, 1,2,5,1,2,3,4,5 compare the number of page faults with frame size 3,4 with LRU page replacement algorithm. Also explain Belady's anomely in detail.
3. Suppose a disk drive has 200 cyclinders the drive is initially at cylinder position 9B. The queue with request from I/O to blocks on cylinders. 86, 147, 91,177 94, 150, 102, 175 130 what is the total head movement needed to satisfy the request for SCAN and C-SCAN scheduling algorithm.

4. Consider the following four processes, with the length of the CPU burst time given in milliseconds.

Process	Burst time (Ms)	Arrival Time (Ms)
P0	15	0.0
P1	20	1.0
P2	3	2.0
P3	7	2.0

Consider the shortest Remaining time first (SRTF) Round Robin (RR) (Quantum = 5ms) Scheduling algorithms. Illustrate the scheduling crantt chart. Which algorithm will give the minimum average waiting time.

5. Consider a paging system with the page table stored in memory.
   a) If a memory reference takes 200 nanoseconds, how long does a paged memory reference take?
   b) If we add TLBs and 75 percent of all page-table references are found in the TLBs, what is the effective memory reference time? Assume that finding a page-table entry in the TLBs takes zero time, if the entry is There.