B.E. Computer Science and Engineering
Third Year First Semester Supplementary Examination 2024

OPERATING SYSTEM

Time: 3 hours | Full Marks: 100

Group A (Total Marks: 8+22=30) [CO2]

1. Answer ANY TWO questions: 4+4=8
   a) What is paging?
   b) What is *external fragmentation*?
   c) What does a *page table* contain?

2. a) Consider the following page reference during a given time interval for a memory consisting of 4 frames : 11,2,3,16,0,11,2,3,8,9,111,2,3,8,9,16,0,8,9,11. Find the hit ratio using Least Recently Used page replacement strategy. Show the contents of memory. Comment on the results and justify your comments.
   b) What is meant by *page fault*? How can *thrashing* be related to *page fault*?
   c) What is the concept behind *demand paging*? (10+4)+(2+3)+3=22

OR

3. a) Consider the following page reference during a given time interval: 11,2,3,16,0,11,2,3,8,9,111,2,3,8,9,16,0,8,9,11. Find the hit ratio using First In First Out page replacement strategy for a memory consisting of (i) 3 and (ii) 4 frames. Show the contents of memory. Comment on the results and justify your comments.
   b) Why is the page size always powers of 2? (12+4)+6=22

Group B (Total Marks: 18+12=30) [CO3]

4. a) What are the requirements for solution to critical section problem?
   b) Consider the following system with 4 processes. Find the *waiting time* of each process using (i) Shortest Job First strategy and (ii) First Come First Served strategy. Provide a comparative analysis of the above mentioned strategies based on the results. 6+12=18

Process	Arrival time	Execution Time
P1	0	6
P2	3	4
P3	4	8
P4	6	5

Contd. Page 2 Group B

OR

5. a) What is the concept of *Priority* scheduling strategy?
b) Consider the following system with 4 processes. Find the *turnaround time* of each process using *First Come First Served* policy. Mention its disadvantages.

Process	Arrival time	Execution Time
A	0	15
B	3	8
C	5	4
D	7	7

c) Compare between *process* and *thread.* 4+(5+3)+6 =18

6. Answer ANY TWO questions: 2X6=12
a) What are the contents of Process Control Block (PCB)?
b) Briefly explain the necessary conditions for deadlock to occur in a system.
c) Discuss briefly any one multithreading model.

Group C (Total Marks: 20) [CO4]

7. a) Explain *linked file allocation* strategy with relative merits and demerits.
b) Disk requests come into the disk driver for cylinders 15, 22, 12, 19, 23, 14, 29 in that order. A seek takes 2.5 msec per cylinder move. What is the total seek time to access all blocks for (i) SCAN and C-SCAN (Both cases: initially moving up from cylinder 0 towards cylinder 299) disk scheduling policies. The disk arm is initially at cylinder 117. Assume the disk arm flies back to cylinder 0 at a rate of 1.5 msec per cylinder. Compare the seek times and comment. 8+(10+2)=20

OR

8. a) Disk requests come into the disk driver for cylinders 51, 32, 12, 90, 45, 76, 23, 14, 42 in that order. A seek takes 2.5 msec per cylinder move. What is the total seek time to access all blocks for Shortest Seek Time First (SSTF). The disk arm is initially at cylinder 117.
b) Compare between *Contiguous File allocation* strategy and *Indexed File allocation* strategy. 8+12=20

Group D (Total Marks: 5+10+5=20) [CO1, CO5, CO6]

9. a) What are the possible different management modules of an operating system software? Justify your answer.
   b) What is *encryption*? What is an *Access Control Matrix?*
   c) What information does *disk inode* in Unix contain? 5+10+5=20

OR

10. a) What are the different *resources* of a computer system? What is *system call*?
    b) What are the different *cryptographic systems*? What do the rows and columns of *Access Control List* denote?
    c) Briefly explain the *File system layout* in Unix. 5+10+5=20

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