1. Explain the deadlock. Discuss the necessary conditions for deadlock?
2. Explain the concept of multi-threading. Discuss the following multi-threading models.
   1. Many-to-one
   2. One-to-one
   3. Many-to-many
3. Describe in brief - the concept of fragmentation.
4. Define the term- Bare Machine.
5. Briefly discuss holes in memory partitioning.
6. Explain control language interpreter and Loader in reference to Resident monitor.
7. Discuss about static partitioning.
8. Write the short note on
   1. i.Overlays
   2. ii.Swapping
9. Illustrate with the help of diagram: internal and external fragmentation.
10. Explain memory management and its requirements.
11. Illustrate the purpose of Device Driver in Resident monitors.
12. Explain memory compaction and ways to implement swapping in detail.
13. Consider a logical address space of eight pages of 1024 words, each mapped onto a physical memory of 32 frames then :
    1. How many bits are in logical address?
    2. How many bits are in physical address?
14. Calculate the total head movement for the following scheduling.
    * + 1. FCFS
        2. SSTF
        3. SCAN
15. What do you understand by deadlock?
16. What are the necessary conditions for deadlock?
17. How can pre-emption be used to resolve deadlock?
18. Write a difference between paging and segmentation?
19. List out the advantage and disadvantage of paged segmentation.
20. Illustrate Segmentation and define its types.
21. If the average page faults service time of 25 ms and a memory access time of 100ns.Calculate the effective access time.
22. Consider the following page-reference string: 1,2,3,4,5,6,7,8,9,10,11,12. How many page faults and page fault ratio would occur for the FIFO page replacement algorithm? Assuming there is four frames
23. Give the steps required to handle a page fault in demand paging with example.
24. Consider a page reference string for a process with a working set of M frames, initially all empty. The page reference string is of length P with N distinct page numbers in it. For any page replacement algorithm,
    * 1. What is a lower bound on the number of page faults?
      2. What is an upper bound on the number of page faults?
25. What is the relationship between FIFO and clock page replacement algorithm?
26. Consider the following page reference string: 2, 3, 4, 2, 1, 5, 6, 4, 1, 2, 3, 7, 6, 3, 2, 1 Calculate the number of page faults would occur for the LRU page replacement algorithm with frame size of 3.
27. Evaluate when page faults will occur? Describe the actions taken by operating system during page fault.
28. Define the Page Fault.
29. Discuss the Thrashing?
30. Discuss the steps needed to handle page fault with neat illustration.
31. What is a process? Discuss components of process and various states of a process with the help of a process state transition diagram.
32. Discuss situation under which the FIFO page replacement algorithm generates fewer page faults than the LRU page replacement algorithm
33. Illustrate what are the various Page Replacement Algorithms used in memory management.
34. Consider the following page reference string: 1, 2, 3, 4, 5, 3,4,1,6,7,8,7, 8, 9, 7, 8, 9, 5, 4, 4, 5, 3 How many page faults would occur for the following replacement algorithms, assuming four frames? Remembering all frames are initially empty.
    * 1. FIFO replacement ii) Optimal replacement
35. Consider the following page reference string: 1,2, 3, 2, 5, 6, 3, 4, 6, 3, 7, 3, 1, 5, 3, 6, 3, 4, 2, 4, 3, 4, 5, 1 Indicate page faults and calculate total number of page faults and successful ratio for FIFO, optimal and LRU algorithms. Assume there are four frames and initially all the frames are empty.
36. What are the differences between paging and segmentation?
37. Why are segmentation and paging sometimes combined into one Scheme?
38. Describe File swapping? List out the file swapping methods.
39. Under what condition(s) a wait state becomes a deadlock?
40. Analyze the concept of swapping and its implementation using different portioning methods.
41. Compare the two: multiprogramming with fixed partitioning and variable partitioning
42. Compare all parts of resident monitors.
43. Justify the different techniques to remove fragmentation in case of multiprogramming with fixed partitions and variable partitions.
44. Given memory partition of 100k, 500k, 200k, 300k and 600k (in order). How would each of the first fit, best fit and worst fit algorithms place processes of 212 K, 417 K, 112 K and 426 K (in order)? Which algorithm makes the most efficient use of memory?
45. Consider the following page-reference string:
46. 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6
47. Calculate how many page faults would occur for the following
48. replacement algorithms, assuming the frame size to be 4. Assume that the
49. frames are initially empty.
    1. LRU replacement
    2. FIFO replacement
50. Describe the memory management concept with advantages and disadvantages.
51. Illustrate the following?
    1. Virtual Memory
    2. Cache Memory
    3. Auxiliary Memory
52. Considering a system with five processes P0 through P4 and three resources of type A, B, C. Resource type A has 10 instances, B has 5 instances and type C has 7 instances. Suppose at time t0 following snapshot of the system has been taken:
53. Analyze what will be the content of the Need matrix. Is the system in a safe state? If yes, then what is the safe sequence?
54. Illustrate the following.
    * 1. Memory Allocation Strategies
      2. Page table structure
      3. Deadlock Recovery
55. Show the page replacement policy with a suitable diagram. Why is it essential for the performance of an operating system?
56. Consider a virtual memory system with FIFO page replacement policy. For an arbitrary page access pattern, increasing the number of page frames in the main memory will
    1. Always decrease the number of page faults
    2. Always increase the number of page faults
    3. Sometimes increase the number of page faults
    4. Never affect the number of page faults
57. Justify your answer with an example.
58. A system uses 3-page frames for storing process pages in the main memory. It uses the Least Recently Used (LRU) page replacement policy. Assume that all the page frames are initially empty. What is the total number of page faults will occur while processing the page reference string given as 4, 7, 6, 1, 7, 6, 1, 2, 7, 2?
59. Answer the following questions using the banker’s algorithm:
    * + 1. What is the content of the matrix “Need”?
        2. Is the system in a safe state?
        3. If a request from process P1 arrives for (0, 4, 2, 0) can the request be
60. granted immediately?
61. Discuss the Process Synchronization in Operating System.
62. Explain the paging in operating systems. Discuss with a diagram.
63. Suppose the moving head disk with 200 tracks is currently serving a request for track 85 and moving towards the larger cylinder number. If the sequence of all request come in the given order 98, 150, 101, 167, 120, 170.