2054
B.E. (Computer Science and Engineering)
Fourth Semester
CS-403: Operating System

Time allowed: 3 Hours

Max. Marks: 50

NOTE: *Attempt __five__ questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.*

x-x-x

Q-1 Explain in brief:

i. Differences between pager and swapper?
ii. What is a page and what is a frame. How are the two related?
iii. Describe process control block with the help of suitable diagram.
iv. Differentiate between paging and segmentation.
v. Write about thread and thread libraries. (2x5)

Section-A

Q-2 (a) What happens when your program tries to access memory that doesn't exist in its virtual address space? (3)

(b) Solve dining philosopher problem using semaphores. (4)

(c) Give the relative advantages and disadvantages of load time dynamic linking and run-time dynamic linking. Differentiate them from static linking. (3)

Q-3 (a) Given a page reference string(arrival) with four-page frames, calculate the page faults with FIFO and LRU page replacement algorithms respectively: 12, 3, 4, 5, 1, 2, 5, 1, 2, 3, 4, 5, 1,6,7,8,7,8,9,7,8,9,5,4,4,5,4,2. (5)

(b) Construct and explain directory structure of a file system in terms of single level, two level and tree structure. (5)

Q-4 (a) What is difference between Deadlock and Starvation? Consider the following four resources A, B, C and D with five processes and answer the questions:

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

i. Is the system in a safe state? Use Banker algorithm. If yes give the sequence.
ii. If a request from process from P1 arrives for (0, 4, 2, 0), can the request be granted immediately? (5)

(b) Define the first-fit, best-fit and worst-fit strategies of memory placement. Given memory partitions of 10 k, 4 k, 20 k, 18 k, 7 k, 9 k, 12 k, and 15 k (in order). How would each of first- fit, best fit and worst fit algorithms place processes of 12 k, 10 k and 9 k (in order)? Which algorithms make the best use of memory? (5)

Section-B

Q-5 (a) Suppose that a disk drive has 100 cylinders, numbered 0 to 99. The drive is currently serving a request at cylinder 43, and previous request was at cylinder 25. The queue of pending request, in FIFO order is:

86, 70, 13, 74, 48, 9, 22, 50, 30

P.T.O.

Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all pending requests for each of the following disk scheduling algorithms?

   i.   FCFS

   ii. SCAN   (5)

(b) What is an operating system? Differentiate between time sharing and real time operating system.   (5)

Q-6 (a) How Second Chance page replacement algorithm differs from FIFO page replacement policy? Discuss the concept of Belady's anomaly with suitable example.   (4)

(b) Explain "race condition" and also state how process synchronization is handled using semaphore? Explain with algorithms.   (3)

(c) What is meant by file attributes? Discuss any one technique of implementing directories in detail.   (3)

Q-7 (a) Explain how file allocation table (FAT) manage the files. Mention the merits and demerits of using FAT.   (5)

(b) How unsafe state differs from deadlock state? Consider following initial state and identify whether requested resource is and granted or denies for the given cases.

Process	Has	Max
A	2	6
B	1	5
C	2	3
D	3	8

Free =2

- What will happen if process D request 1 resource?

- what will happen if process A request 1 resource?   (5)

x-x-x