OS Question Sheet

- *One Marker*

1. Define the term 'Loader'.
2. Write any four elements of programming environment.
3. Write any two limitations of stack-based memory allocation.
4. What is function of bootstrap loader?
5. What will happen if all processes are CPU bound in system?
6. List any two examples of many to many model.
7. Define dispatch latency.
8. What is race condition?
9. Define starvation.
10. What are various dynamic allocation memory management methods?
11. Give any two disk allocation methods.
12. State two general approaches that are used to handle critical section in operating system.
13. Define turnaround time.
14. List any four file attributes.
15. What is role of valid and invalid bit in demand paging?
16. Define Re-entrant code.
17. State two benefits of multi-threaded programming.
18. What is Aging?
19. "Counting semaphore can be implemented by using binary semaphore." True/False Justify.
20. What is race condition?

21. Define Starvation.

22. What is the main function of microkernels?

23. List any two operating system examples that uses one to one model.

24. What will happen if all processes are I/O bound in system?

25. Give any four criteria for computing various scheduling algorithms.

26. Which two standard atomic operations can access semaphore value?

27. What is rollback?

28. Define Re-entrant code.

29. Define acyclic graph directory.

30. What is the advantage of paging with segmentation model?

31. Give examples of operating system with user pthread.

32. Write advantages of multiprocessor system.

33. What is dispatch latency?

34. Define Request edge and Claim edge.

35. "A race condition exists when processes are running simultaneously." True/False. Justify.

36. Write any two disadvantages of priority scheduling.

37. Using segmentation, find the physical address for the logical address 2,280, having segment size 285 with base address 3000.

38. List any four file attributes.

39. "Newly created directory will have two entries automatically in it." Comment.

40. List various dynamic allocation memory management methods.

41. Define I/O bound process.

• *Five Marker (first)*

1. Write a note on relocatable program and self-relocatable program.
2. Explain PCB with proper diagram.
3. Consider the following set of processes, with the length of CPU burst time and arrival time in milliseconds:

Process	Burst time	Arrival time
P1	4	2
P2	6	0
P3	2	1

   Illustrate the execution of these processes using Round Robin (RR) CPU scheduling algorithm (quantum = 3 milliseconds). Calculate average waiting time and average turn around time. Give the contents of Gantt chart.
4. Consider a system with 7 processes A through G and six types of resources R through W with one resource for each type.
   Resource ownership is as follows :
   A holds R and wants S
   B holds nothing but wants T
   C holds nothing but wants S
   D holds U and wants S and T
   E holds T and wants V
   F holds W and wants S
   G holds V and wants U.
   Is the system deadlocked, and if so, which processes are involved?
5. What is process? State and explain in brief different types of process states.

6. Consider the following snapshot of the system:

Process	Burst Time	Arrival Time	Priority
P_1	10	0	3
P_2	5	4	0 (high)
P_3	2	3	1
P_4	16	5	2
P_5	8	2	4 (low)

Schedule the above set of processes according to:

(i) Non-preemptive priority scheduling algorithm.

(ii) FCFS.

Draw proper Gantt chart and find average turn around time

and average waiting time.

7. Consider the following snapshot of the system:

	Allocation				Max				Available		
	A	B	C		A	B	C		A	B	C
P_0	0	1	0		7	5	3		3	3	2
P_1	2	0	0		3	2	2				
P_2	3	0	2		9	0	2				
P_3	2	1	1		2	2	2				
P_4	0	0	2		4	3	3				

Answer the following using Banker's algorithm:

(i) What is content of Need Matrix?

(ii) Is the system in a safe state?

8. What is context switching? State conditions when context switching occur.

9. Consider the following set of processes CPU time given in milliseconds:

Process	Burst time	Arrival time
P_1	5	1
P_2	3	0
P_3	2	2
P_4	4	3
P_5	8	2

Illustrate the execution of these process using FCFS and preemptive SJF CPU scheduling algorithm.

10. Consider a system with four processes P_1, P_2, P_3, P_4, and four resource types A, B, C, D with one instance of each type. Resource ownership is as follows:

P_1 holds A and wants C

P_2 holds B

P_3 holds D and wants B

P_4 holds C and wants D.

Is system deadlock? (Draw resource allocation graph and wait-for graph.

11. What are co-operating processes? Explain two fundamental models of inter-process communication.

12. Consider the following set of processes with the length of CPU burst time and arrival time in milliseconds:

Process	Arrival time	Burst time
P_1	0	8
P_2	1	4
P_3	2	9
P_4	3	5

Illustrate the execution of these processes using pre-emptive SJF (Shortest Job First) CPU scheduling algorithm. Calculate average waiting time and average turn around time. Give the contents of Gantt Chart.

13. What is Semaphore? Explain Bounded-Buffer problem.

- *Five Marker (second)*

1. Construct indirect triples and quadruples for the following expression:

   $a = b * - c + b * - c$

2. List the various factors which affect pass structure. Compare single pass translation and multipass translation.

3. What is a semaphore? Explain dining philosopher problem.

4. Discuss the various techniques of free space management in file system.

5. Consider the following page reference string:

   1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5.

   How many page faults would occur for the following page replacement algorithms?
   a. LRU
   b. FIFO.

6. Consider page reference string as follows:

   1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 3

   Assume 3 frames. Find the number of page faults according to:
   a. FIFO page replacement algorithm
   b. LRU page replacement algorithm.

7. What is deadlock? Explain deadlock prevention strategies.

8. What is critical section problem? Explain two general approaches to handle critical section in operating system.

9. What is critical section problem? How is it solved?

10. Explain in brief indexed file allocation methods with advantages and disadvantages.

11. What is fragmentation? Explain internal and external fragmentation in detail.
12. What is Fragmentation? Explain types of fragmentation with suitable example.
13. Explain tree-structured directories along with its advantages and disadvantages.
14. Consider the following snapshot of a system with 5 processes P_0, P_1, P_2, P_3, P_4 and three resource types A, B, C:

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P_0	2	3	2	9	7	5	3	3	2
P_1	4	0	0	5	2	2			
P_2	5	0	4	11	0	4			
P_3	4	3	3	4	4	4			
P_4	2	2	4	6	5	5			

Answer the following questions using Banker's algorithm.
   1. What are the contents of need matrix?
   2. Is the system in a safe state? If yes, find safe sequence.

- *Ten Marker*

1. Questions
   a. State and explain criteria for computing various scheduling algorithms. [4]
   b. Explain internal and external fragmentation. [4]
   c. Explain any two benefits of multithreading. [2]
2. Questions
   a. Explain tree-structured directories along with advantages and disadvantages. [4]
   b. Explain the term "Select a victim and Rollback" in the context of deadlock recovery. [4]
   c. Explain any two benefits of virtual machine. [2]
3. Questions
   a. Consider the following segment table: [4]

Segment	Base	Length
0	363	500
1	1272	20
2	1675	1500
3	986	240
4	211	130

   What are Physical addresses for the following Logical addresses?
   (i) 0,425
   (ii) 2,500
   (iii) 1,150
   (iv) 3,285
   b. What is external fragmentation? What are various ways to avoid external fragmentation? [4]

    c. Explain any two benefits of multithreaded programming. [2]

4. Questions

    a. Explain tree structured directories along with advantages and disadvantages. [4]

    b. Explain multilevel feedback queue scheduling with diagram. [4]

    c. What is a wait-for-graph? [2]

5. Questions

    a. Explain multilevel queue scheduling with diagram. [4]

    b. Consider the following page reference string: [4]

        7, 5, 6, 2, 9, 5, 7, 6, 2, 7, 6, 5, 2, 7, 2, 7, 8

    How many page faults will occur for the following page replacement algorithms? Assume 3 frames:

        i. FIFO

        ii. Optimal Replacement.

    c. State two benefits of multithreaded programming. [2]

6. Questions

    a. Explain different file access methods. [4]

    b. How the system is prevented from deadlock? [4]

    c. What is the main function of microkernels? [2]

7. Questions

    a. What is critical section problem? Give Peterson's solution to solve critical section problem. [4]

    b. Write a short note on deadlock prevention strategies. [4]

    c. Write benefits of virtual machine. [2]

8. Questions

a. Consider the following page replacement string:

7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2

How many page faults would occur for the LRU page replacement algorithm (Assume three frames)? [4]

b. Write a note on multilevel queue scheduling. [4]

c. Differentiate between user level thread and kernel level thread. [2]