1. What are the operations are performed on semaphore? write solution for readers- writers classic problem using semaphore.
2. What is the use of monitor? Discuss dining philosopher problem's solution using monitor.
3. What is semaphore? Write solution for bounded buffer producer-consumer problem using semaphore.
4. Define critical section. Discuss solution of Critical section problem.
5. Define Deadlock. Describe necessary conditions for the deadlock.
6. Describe the usage of resource allocation graph (RAG) with reference to deadlock of the system.
7. Draw the resource allocation graph of the system.

Allocation	Request
R1→P2, R1→P3, R2→P1, R2→P4	P1→R1, P3→R2

   Will deadlock occurs or not? Consider two instances of each resource type R1 &R2.

8.

Consider the following snapshot of system.

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

Answer the following question using Banker's Algorithm:
i)   What is the content of matrix Need?
ii) Is the system in safe state? If yes then write a safe sequence.
iii) If a request from process P1 arrives for (0, 1, 0, 0) can the request granted immediately?

9. Explain paging with diagram.
10. Explain different paging implementation techniques.
11. Explain segmentation with paging.
12. Why there a need of virtual memory? Explain following terms:
(i)   Valid invalid bit
(ii)   COW
(iii) Dirty bits
(iv)   Thrashing
13. Consider a system with byte-addressable memory, 32 bit logical addresses, 2 kilobyte page size and page table entries of 4 bytes each. The size of the page table in the system in megabytes is _____.

14. Consider a single level paging scheme with a TLB. Assume no page fault occurs. It takes 9 ns to search the TLB and 100 ns to access the physical memory. If TLB hit ratio is 80%, the effective memory access time is _____ msec.

15. For given reference string: 1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5 apply FIFO, Optimal & LRU page replacement algorithms & analyze which is more efficient. Also calculate the page fault percentage in each.

Note: Assignment-2 is only for those students who will get less than 8 marks in second internal exam.