



- c) Consider the following processes where Arrival and Burst time (in seconds) are as shown below.

process	Burst Time	Arrival Time
P1	13	3
P2	15	3
P3	8	1
P4	12	1

Calculate the Average Waiting Time and Average turn-around Time if the processes are scheduled using SJF. [6]

- Q5) a) Explain memory management with Bit Map method and with Linked Lists method. [5]
- b) What do you mean by page replacement algorithm? Enlist different page replacement algorithms. [5]
- c) Consider the following page reference string: 7, 1, 2, 1, 2, 5, 4, 5, 9, 4, 9, 8, 1, 3. The number of page frames = 3, calculate the page faults and the hit ratio for First In First Out Page replacement algorithm. [6]

OR

- Q6) a) How logical address is converted into physical address by memory management unit? Explain it with example. [5]
- b) What is structure of typical page table entry? What is significance of modified bit, referenced bit, protection bits, and present/absent bit in page table entry? [6]
- c) Explain how LRU page replacement algorithm is simulated in software? [5]

- Q7) a) What are different file types and how to access it. [6]
- b) What is difference between programmed I/O and I/O mapped I/O. [4]
- c) Explain input output software layers. [6]

OR

- Q8) a) Explain Programmed I/O, Interrupt driven I/O, and I/O using DMA with examples. [9]
- b) Explain in detail file systems and its implementation. [7]

