

- N.B. 1) All questions are compulsory.
2) Figures to the right indicate marks.

Q. 1 Attempt the following (Any four) (20M)

- What is Thread? Explain various multithreading models.
- Write a note on real time operating system.
- Write different services provided by operating system.
- Explain Interprocess communication.
- What are the different states of process? Explain it.
- Explain CPU Scheduling criteria.

Q. 2 Attempt the following (Any four) (20M)

- What is Deadlock? Explain deadlock conditions.
- What is semaphore? Explain types of semaphore.
- Consider the processes which are given below in the table having arrival time is 0 and burst time is given. Calculate avg waiting time for SJF SCHEDULING

Process	Burst Time
P1	10
P2	20
P3	6
P4	4
P5	2

- Explain deadlock prevention.
- Considering a system with five processes P_0 through P_4 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 t_0 following snapshot of the system has been taken:

Process	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	

What will be the content of the Need matrix? Is the system in a safe state? If Yes, then what is the safe sequence?

- Explain RR scheduling algorithm with example.

Q. 3 Attempt the following (Any four)

(20M)

- (a) What is Virtual Memory? Explain in brief.
- (b) Write short notes on:
 - 1) paging 2) Interrupt
- (c) Consider page reference string 1, 3, 0, 3, 5, 6, 3 with 3 page frames.
Find the number of page faults using FIFO.
- (d) Explain different file operations.
- (e) Explain in detail multilevel queue scheduling.
- (f) Explain FCFS disc scheduling with example.

Q. 4 Attempt the following (Any five)

(15M)

- (a) What is Operating system? Explain function of operating system.
- (b) Write a short note on multicore programming?
- (c) Describe directory structure.(any two)
- (d) Write short note on 1.MMU 2.PAGE TABLE
- (e) Explain Thrashing.
- (f) Write a note on DMA.