



## AUTUMN MID SEMESTER EXAMINATION-2024

School of Computer Engineering  
 Kalinga Institute of Industrial Technology, Deemed to be University  
 Operating System  
 [CS-2002]

**Time: 1 1/2 Hours**

**Full Mark: 20**

*Answer Any four questions including question No.1 which is compulsory.*

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable and all parts of a question should be answered at one place only.*

1. Answer all the questions. [ 1 Mark X 5 ]

- a) What is the role of long term scheduler and how it is different than short term scheduler?
- b) State the difference between multi-programming and multiprocessing operating system.
- c) Assume that 3 processes all with requirements of 1 second of CPU time each and no I/O arrives at the same time. What will be the Avg. time to completion for the processes if Round Robin CPU scheduling is used with 0.1 sec time span and assume no overhead for context switch.
- d) The arrival and burst times of three processes P0, P1, and P2, are given in the following table.

Process	Arrival Time (ms)	Burst Time (ms)
P0	0	9
P1	1	4
P2	4	7

The algorithm employed is the pre-emptive shortest job first scheduling. Scheduling is performed only at the arrival of the processes. What is the average waiting time for the three processes?

- e) A counting semaphore S is initialized to 10. Then 6 WAIT operations and 4 SIGNAL operations were completed on this semaphore. What would be the resulting value of S?
2. The arrival time and duration of the CPU and I/O bursts for each of the three processes A, B, and C are given in the table below. Each process has a CPU burst followed by an I/O burst followed by another CPU burst. Assume that each process has its own I/O resource.

Process	Arrival time	CPU burst	I/O burst	CPU burst
A	0	1	4	4
B	2	3	3	1
C	3	1	3	1

The multi-programmed operating system uses the shortest remaining time first (SRTF) scheduling. What are the completion times of the processes A, B, and C and find individual waiting times of processes? [ 5 Marks ]

3. Draw process state diagram to explain the life cycle of a process. What are the steps involved during the context switching? [ 5 Marks ]

4. Consider process arrival as given below where N = right most significant digit of your Roll No.( ex:- for Roll No. 180854, N=4):

Process	CPU Burst Time	Arrival Time	Priority
A	10	0	3
B	17	5	2
C	5	9	N
D	2	N	1
E	9	7	6

Calculate the following for priority (pre-emptive) and round robin (time quantum = 3 ms) CPU scheduling algorithm:

- i. Average waiting time
- ii. Turnaround time for each process
- iii. Order of completion

(Note:-lower digits indicate higher priority)

[ 5 Marks ]

5. What you mean by process synchronization? Clearly explain the classic synchronization Bounded Buffer Problem by taking buffer size=5.

[ 5 Marks ]