

# END TERM EXAMINATION

SIXTH SEMESTER [B.TECH] JULY-2023

Paper Code: ETCS-304

Subject: Operating Systems

Time: 3 Hours

Maximum Marks:75

Note: Attempt five questions in all including Qno.1 which is compulsory. Select one question from each unit.

Q1 Attempt any Five

[5x5=25]

- (a) What is the meaning of the term *busy waiting*? What other kinds of waiting are there in an operating system? Can busy waiting be avoided altogether? Explain your answer.
- (b) What is multiprogramming operating system? How it is different from Multiprocessing. Explain.
- (c) Explain Process Control Block with the help of suitable diagram in detail.
- (d) Explain race condition with suitable example?
- (e) What are the four conditions that must be present for a deadlock to be possible?
- (f) What are various file attributes?

### UNIT-I

- Q2 (a) Explain the layered approach of Operating System? What are main task of OS? [6]
- (b) Given Memory Partitions of 100K,500K,200K,300K and 600K (in order), how would each of the first fit, best fit, and worst fit algorithms place processes of 212K,417K,112K and 426K (in order)? Which algorithms make the most efficient use of memory? [6.5]

- Q3 (a) Explain the difference between logical and physical addresses. [3]
- (b) Why are pages sizes always power of 2? [3]
- (c) Consider there are 4 frames allocated to a process and the page reference string is:

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

Calculate the number of page faults for the FIFO and LRU page replacement algorithms. [6.5]

### UNIT-II

- Q4 (a) Consider the following set of processes with the CPU burst & arrival time in milliseconds. [6.5]

Process	Arrival Time	Burst Time
A	0	12
B	1	7
C	2	9
D	3	4
E	4	11

Draw the Gantt chart & find:

P.T.O.

- i Average waiting time for these processes with the Shortest Remaining Time First, Round Robin (Time quantum = 3ms) & FCFS scheduling algorithm.
  - ii Average turnaround time for these processes with the SRTF, Round Robin & FCFS Algo.
- (b) Explain the Dining Philosophers classical IPC problem and its solution. [6]

- Q5 (a) What is thread? What are the differences between user-level threads and kernel-level threads? Under what circumstances is one type better than the other? [6]
- (b) Explain bakery algorithm. Prove that it satisfy all the three requirements for critical section problem. [6.5]

**UNIT-III**

- Q6 (a) A disk with 1000 cylinders, numbered 0 to 999, compute the number of tracks the disk arms must move to satisfy the entire request in the disk queue. Assume the current request serviced is at track 345 and head is moving towards track 0. The queue in FIFO order contains request for the following tracks: 123,874,692,400,475,105,376. Perform the computation for the following scheduling algorithm- [6.5]  
 (1) FIFO (2) SSTF (3) SCAN (4) C-SCAN (5) LOOK
- (b) Explain resource allocation graph. [3]
- (c) What is Safe state? Explain with the help of suitable example. [3]
- Q7 (a) Explain Banker's Algorithm including safety algorithm & resource request algorithm? [6]
- (b) Consider the following snapshot of a system- [6.5]

Process	Allocation				Maximum			
	A	B	C	D	A	B	C	D
P1	0	0	1	2	0	0	1	2
P2	2	0	0	0	1	7	5	0
P3	1	3	5	4	2	3	5	6
P4	0	6	3	2	0	6	5	2
P5	0	0	1	4	0	6	5	6

Let the available number of resources be given by avail vector as (1, 5, 2, 0). Use banker's algorithm and answer.

- Find the contents of the matrix "NEED".
- Is the system in a safe state?
- If a request from process P1 for (0, 4, 2, 0) arrives, can it be granted immediately?

**UNIT-IV**

- Q8 (a) Explain various types of file and file access methods? [6.5]
- (b) What do you mean by directory structure? Explain various directory structures with suitable diagram? [6]
- Q9 Write short notes on **any two**: - [6.25x2=12.5]
- (a) Logical file system v/s Physical file system
  - (b) FAT v/s NTFS
  - (c) Explain various file allocation strategies

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