MCA 2nd Semester Examination, 2023

MCA

(Advanced Operating System)

PAPER – MCA-202

Full Marks : 100

Time : 3 hours

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

GROUP–A

Answer any **five** questions : 2×5

1. What is pure demand paging ?

2. What do you mean by real time operating system ?

3. What is the difference between multitasking and multiprocessing ?

4. What is the concept of reentrancy ?

5. What is system call ?

6. A logical address space of 128K, physical memory size of 32K and page size of 8K, then how many bits are required for displacement, page number and frame number ?

7. What is TLB ?

8. What are the necessary conditions for solution to Critical-section problem ?

GROUP–B

Answer any **four** questions : 15×4

9. What is paging ? Design the hardware mapping from logical memory address to physical memory address using paging scheme with

explanation. What are the demerits of paging? Consider a paging system, it takes 10ns to search translation look aside buffer (TLB) and 80 ns to access main memory. If the TLB hit ratio is 80%, then find effective memory access time.

3 + 6 + 2 + 4

10. Consider following five processes $P1$ to $P5$. Each process has its unique priority, burst time, and arrival time.

Process Id	Arrival time	Burst time	Priority
$P1$	0	4	1
$P2$	0	3	2
$P3$	6	7	1
$P4$	11	4	3
$P5$	12	2	2

If the CPU scheduling policy is priority scheduling, calculate the average waiting time and average turn-around time. What is semaphore? How the dinning philosopher problem can be solved using semaphore. 7 + 2 + 6

11. Using the second chance or Clock page replacement policy let's say the reference string is 0 4 1 4 2 4 3 4 2 4 0 4 1 4 2 4 3 4 and we have 3 frames. Let's show how the algorithm proceeds by tracking the second chance bit and the pointer. What is Belady's anomaly-explain with an example. What is buddy allocation ? What do you mean by locality of reference ? $6 + 5 + 2 + 2$

12. What is the difference between fixed-partition and variable-partition multiprogramming ? Define seek and latency time ? Consider with a request queue (0-199) of Tracks 98, 183, 37, 122, 14, 124, 65, 67 and Head pointer at 53. Find the total number of track movement in SSTF, SCAN and C-Look policy with proper diagram. What is kernel ? $3 + (1 + 1) + (3 \times 3) + 1$

13. What do you mean by critical-section ? What are the necessary conditions for the solutions to the critical section-problem ? Consider in multipro-

(*Continued*)

gramming scheme, the unallocated memory partitions size of 15k, 20k, 18k, 8k, and 12k. The job queue of contain five processes of size 6k, 12k, 15k, 16k and 14k. Allocate the jobs in best, worst and first fit policy. Give neat diagram and find the allocated fragmentation area in each policy. $3 + 3 + (3 \times 3)$

14. Relate the term deadlock-avoidance, deadlock-prevention and deadlock avoidance algorithm. Explain the wait-for-graph algorithm. What is thread ? What is the difference between thread and process ? $5 + 4 + 2 + 4$

15. Write short note on : 3×5

(*i*) Thrashing

(*ii*) Stravation

(*iii*) Race-condition

(*iv*) Process-Control-Block

(*v*) Aging.

16. What is difference between Mutex and Semaphore in Operating System ? Find the average-waiting and turn-around time using the shortest-remaining time first algorithm for the following.

Process	Arrival time	Burst time
*P*1	1	6
*P*2	1	8
*P*3	2	7
*P*4	3	3

Discuss the difference between paging and segmentation. What are the different message passing mechanisms ? 3 + 5 + 4 + 3

[Internal Assessment — 30 Marks]