2022

MCA

2nd Semester Examination

ADVANCED OPERATING SYSTEM

PAPER—MCA-202

Full Marks : 100

Time : 3 Hours

The figures in the margin indicate full marks.

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

Illustrate the answers wherever necessary.

Group—A

1. Answer any *five* questions : 5×2

(a) What is swapping ?

(b) What do you mean by thrashing ?

(c) What is the difference between spooling and buffering ?

(d) What is the concept of reentrancy ?

(e) What is the difference between logical address and physical address ?

(f) A logical address space of 64K, physical memory size of 32K and page size of 4K, then how many bits are required for displacement, page number and frame number ?

(g) What is kernel ?

(h) What are the primary functions of VFS ?

Group—B

Answer any *four* questions. 4×15

2. What is segmentation ? Design the hardware mapping from logical memory address to physical memory address for segmentation. What are the demerits of segmentation ? Define response time and throughput. 3+6+2+4

3. Consider the set of 5 processes whose arrival time and burst time are given below :

Process Id	Arrival time	Burst time
P1	0	5
P2	1	3
P3	2	1
P4	3	2
P5	4	3

If the CPU scheduling policy is Round Robin with time quantum = 2 unit, calculate the average waiting time and average turn around time. What is semaphore ? How the producer consumer problem can be solved using semaphore. 7+2+6

4. What do you mean by hierarchical paging — explain with example ? What is TLB ? What is demand paging ? Consider the reference string 3, 1, 2, 1, 6, 5, 1, 3 with 3-page frames. Find the number of page fault using LRU page replacement algorithm. 6+3+2+4

5. What is the difference between preemptive and non-preemptive scheduling? What do you mean by multithreading? What is starvation? Consider the set of 4 processes whose arrival time and burst time are given below :

Process Id	Arrival time	Burst time
P1	0	6
P2	1	4
P3	2	2
P4	3	3

If the CPU scheduling policy is Shortest Remaining Time Next, calculate the average waiting time and average turn around time. 4+3+3+5

6. Consider in a paging scheme α = 80%, ε = 20 ns for TLB search, 100 ns for memory access. What is the value of Effective Access Time (EAT)? What is inverted page table? What do you mean by asymmetric clustering? What is virtual memory? 4+4+4+3

7. What do you mean by process synchronization? What is IPC? What are the different IPC mechanisms? Explain any two in details. Consider in multiprogramming scheme, the unallocated memory partitions size of 16K, 21K, 10K, 8K and 12K. The job queue of contain five processes of size 6K, 12K, 15K, 18K and 14K. Allocate the jobs in best fit policy. Give neat diagram. 3+2+3+4+3

8. Define cylinder and latency time of disk. 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. 3+(3×4)

9. "A cycle does not necessarily imply a deadlock." Justify the statement. Assume that we have the following resources : 5 Pen drives, 2 Printers, 4 Scanners, 3 Hard disks. Assume there are four processes. The available resources are already allocated as per the matrix table below. Is the system in a safe state? *Show each state clearly.*

Process Name	Pen Drives	Printer	Scanner	Hard disk
P	2	0	1	1
Q	0	1	0	0
R	1	0	1	1
S	1	1	0	1

What are the necessary conditions in deadlock?

5+6+4

[Internal assessment – 30]

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