2023

BCA 3rd Semester (CBCS) Examination

Operating System

PAPER — CC-6T

Full Marks : 50

Time : 2 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.

Illustrate the answers wherever necessary.

Answer from **all** the Groups as directed.

GROUP—A

1. Answer *any* **five** questions : 2×5=10

(a) What is Kernel?

(b) What is spooling?

(c) Write the difference between process and thread.

(d) Define TLB.

(e) What do you mean by 'convoy effect'?

(f) What is the difference between multitasking and multiprogramming operating systems?

(g) What is the cause of thrashing?

(h) What is the reason for Bélády's Anomaly?

GROUP—B

2. Answer *any* **four** questions : 5×4=20

(a) Explain process state in OS. What are the function of schedulers in OS? 3+2=5

(b) Write a short note on PCB. Distinguish between pre-emptive and non-pre-emptive scheduling. 3+2=5

(c) What is the difference between deadlock and starvation? Discuss the necessary conditions for deadlock. 2+3=5

(d) Compute average turnaround time and average waiting time for the Round Robin (quantum = 2ns) scheduling method. 5

Process	Burst Time	Arrival Time
*P*1	4	2
*P*2	2	1
*P*3	5	1
*P*4	3	3

Draw the Gantt chart for the above scheduling method.

(e) Consider the following page-reference string 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.

How many page faults would occur for the LRU replacement and optimal page replacement algorithms, assuming three frames? Remember all frames are initially empty. 2½×2

(f) How can we generate disk access time?

Consider a disk queue with requests for I/O to blocks on cylinders 98, 183, 41, 122, 14, 124, 65, 67. The head is initially at cylinder number 53 moving towards larger cylinder numbers on its servicing pass. The cylinders are numbered from 0 to 199. Find the number of head movements in cylinders using SCAN and C-SCAN scheduling algorithm. 1+(2×2)

GROUP—C

3. Answer *any* **two** questions : 10×2=20

(a) What is the need of paging? Write the difference between paging and segmentation. Consider a machine with 64 MB physical memory and a 32 bit virtual address space. If the page size is 4 KB, what is the approximate size of the page table? Draw a neat diagram. 3+2+5=10

(b) Write the purpose of RAG in memory management. What are the operations in Semaphores?

A single processor system has three resource types *X*, *Y* and *Z*, which are shared by three processes. There are 5 units of each resource type. Consider the following scenario, where the column allocation denotes the number of units of each resource type allocated to each process and the column request denotes the number of units of each resource type requested by a process in order to complete execution. Is the process in safe state or not? If yes, write the safe sequence. 3+1+6=10

	Allocation			Request		
	X	*Y*	*Z*	*X*	*Y*	*Z*
P0	1	2	1	1	0	3
P1	2	0	1	0	1	2
P2	2	2	1	1	2	0

(c) Discuss in detail about critical section problem and also write the algorithm for readers-writers problem with semaphore. What are the requirements of synchronization mechanisms? 3+3+4=10

(d) Consider the set of 3 processes with burst time and arrival time.

Process	Burst Time	Arrival Time
P1	9	0
P2	4	1
P3	9	2

If the CPU scheduling policy is SRTF, calculate the average waiting time and average turn-around time. 5

What is demand paging? Differentiate between symmetric and asymmetric multiprocessing. 2+3=5

★★★