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Paper Code : BCA-301

OPERATING SYSTEMS

Time Allotted: 3 Hours   *Full Marks*: 70

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words
as far as practicable.

Group – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for each of the following: 1×10=10

   (i) Locality of references justifies the use of

   (a) Interrupts   (b) Polling

   (c) DMA   (d) Cache memory

   (ii) Which scheduling policy is most suitable for time shared operating system?

   (a) SJF   (b) RR

   (c) FCFS   (d) Elevator

   (iii) Thrashing

   (a) reduces page I/O.   (b) decreases the degree of multi programming

   (c) implies excessive page I/O.   (d) improve system performance.

   (iv) Increase of RAM in a computer typically improves performance because

   (a) virtual memory increases.   (b) larger RAMs are faster.

   (c) fewer page faults occur.   (d) fewer segmentation fault.

   (v) Dirty bit indicates

   (a) helps avoid unnecessary write on a paging device.

   (b) helps maintain LRU information.

   (c) allows only read on a page.

   (d) None of the above

(vi) A set of resources allocations such that the system can allocate resources to each process in some order and still avoid a deadlock is called

(a) Unsafe State

(b) Safe State

(c) Starvation

(d) Greedy Allocation

(vii) The main function of the dispatcher is

(a) Swapping a process to the disk.

(b) Assigning ready process to the CPU.

(c) Suspending some of the processes when the CPU load is high.

(d) Bring processes from the disk to the main memory.

(viii) The total time to prepare a disk drive mechanism for a block of data to be read from it is

(a) Seek time

(b) Latency time

(c) Seek time and Latency time

(d) Transmission time

(ix) Which of the following disk scheduling strategies is likely to give the best throughput?

(a) Farthest cylinder next

(b) Nearest cylinder next

(c) First come first serve

(d) Elevator algorithm

(x) Context switching is

(a) part of spooling

(b) part of polling

(c) part of interrupt handling

(d) part of interrupt servicing

Group – B

(Short Answer Type Questions)

Answer *any three* of the following. 5×3=15

2. Define Thread and compare fork() and clone(). 2+3=5

3. What is Belady's Anomaly? Explain with an example.

4. Compare CSCAN and CLOOK disk arm scheduling algorithms with examples.

5. Explain with examples the difference between preemptive and non-preemptive priority scheduling.

6. Distinguish between starvation and deadlock.

Group – C

(Long Answer Type Questions)

Answer *any three* of the following.   15×3=45

7. (a) Discuss different data structure implementations of Page Table.

    (b) Discuss paging with segmentation scheme of memory management.

    (c) Discuss Bounded Buffer Producer Consumer problem with pseudo code.   6+3+6=15

8. (a) Explain Peterson's 3rd algorithms with pseudo code. Discuss the merits and demerits of this algorithm.

    (b) Discuss writer biased "Readers-Writers" problem with pseudo code with the help of semaphores.

    (c) The address sequence generated by tracing a particular program executing in a pure demand paging system with 100 bytes per page is

    0100, 0200, 0430, 0499, 0510, 0530, 0560, 0120, 0220, 0240, 0260, 0320, 0410.

    Suppose that the memory can store only one page at a time and if X is the address which causes a page fault then from addresses X to X+99 are loaded on to the memory. How many page faults will occur?
    6+3+6=15

9. (a) Differentiate between internal and external fragmentation. Compare Best fit and Worst fit searching strategy.

    (b) Explain manual recovery mechanism of deadlock in details.

    (c) What is demand paging?
    6+6+3=15

10. (a) Consider the following snapshot of a system:

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

    Examine the system is in safe state or not.

    (b) What is memory compaction? What is its use?

    (c) Explain PCB with a neat diagram.
    5+(3+3)+4=15

11. (a) Calculate and compare the average cylinder movements for the SSTF algorithm:

27, 129, 110, 186, 147, 41, 10, 64, 120

(Suppose the disk drive has 200 cylinders numbered 0 to 199. The drive is currently serving a request at cylinder 143.)

(b) Consider the following set of process; calculate the average waiting time for the preemptive SRTF scheduling algorithm. Show the Gnatt chart also.

Process	Arrival time	Process time
A	0	3
B	1	5
C	3	2
D	9	5
E	12	5

(c) Explain the following file access methods with example:

(i) Direct

(ii) Sequential

(iii) Indexed sequential

4+5+6=15